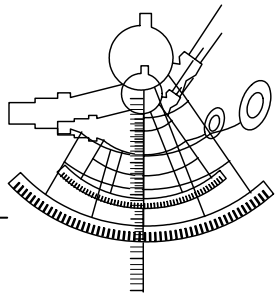
2003 European innovation scoreboard: technical paper no 2 analysis of national performances

European Trend Chart on Innovation



2003 European Innovation Scoreboard: Technical Paper No 2 Analysis of national performances

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The European Trend Chart on Innovation

Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aimed at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States. The 'First Action Plan for Innovation in Europe', launched by the European Commission in 1996, provided for the first time a common analytical and political framework for innovation policy in Europe.

Building upon the Action Plan, the *Trend Chart on Innovation in Europe* is a practical tool for innovation policy makers and scheme managers in Europe. Run by the European Commission (Innovation Directorate of DG Enterprise), it pursues the collection, regular updating and analysis of information on innovation policies at national and Community level, with a focus on innovation finance; setting up and developing innovative businesses; the protection of intellectual property rights; and the transfer of technology between research and industry.

The Trend Chart serves the "open policy co-ordination approach" laid down by the Lisbon Council in March 2000. It delivers summarised and concise information and statistics on innovation policies, performances and trends in the European Union. It is also a European forum for benchmarking and the exchange of good practices in the area of innovation policy.

The Trend Chart products

The Trend Chart on Innovation has been running since January 2000. It tracks innovation policy developments in all EU Member States, plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovak Republic and Slovenia. The Trend Chart website (www.cordis.lu/trendchart) provides access to the following services and publications:

- the European Innovation Scoreboard and other statistical reports;
- regular country reports for all countries covered;
- a database of policy measures across Europe;
- a "who is who?" of agencies and government departments involved in innovation;
- regular trend reports covering each of the four main themes;
- benchmarking reports from the Trend Chart workshops;
- a news service and thematic papers;
- the annual reports of the Trend Chart.

The present report was prepared by **Hugo Hollanders** of **MERIT** (www.merit.unimaas.nl). The information contained in this report has not been validated in detail by either the Member States or the European Commission.

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European Innovation Scoreboard

The European Innovation Scoreboard (EIS) was developed at the request of the Lisbon European Council in 2000[1]. It focuses on high-tech innovation and provides indicators for tracking the EU's progress towards the Lisbon goal of becoming the most competitive and dynamic knowledge-based economy in the world within the next decade.

The 2003 EIS contains 19 main indicators, selected to summarize the main drivers and outputs of innovation. These indicators are divided into four groups: Human resources for innovation (5 indicators); the Creation of new knowledge (4 indicators); the Transmission and application of knowledge (3 indicators); and Innovation finance, output and markets (7 indicators).The EIS complements the *Enterprise Policy Scoreboard*[2] and other benchmarking exercises of the European Commission. It mainly uses Eurostat data. Six indicators are drawn from the European Commission's Structural indicators. Eight indicators are also used by DG Research under the "Investing in Research" Action Plan for Europe[3].

All indicators have been updated based on data availability as of September 23, 2003. The 2003 EIS offers a number of improvements compared to the 2002 EIS. Most importantly, it will uses new and more detailed data from the 3rd Community Innovation Survey (CIS-3). It provides a substantially improved coverage of innovation in services. A supplementary technical report, the *Sectoral Innovation Scoreboard* (SIS), replicates the EIS, where possible, for four manufacturing classes: high medium-high, medium-low, and low technology. The background national context that influences innovation performances across the 15 EU member states is described in a second supplementary report on *National Innovation Systems* (NIS).

The EIS is complemented by six technical papers:

- Technical Paper No 1: Indicators and definitions
  Full definitions and graphs for all indicators.
- Technical Paper No 2: Analysis of national performances
  Detailed EIS results for current and trend data, innovation leaders, relative strengths and weaknesses per country, and country pages with both current and trend graphs.
- Technical Paper No 3: Regional innovation performances
  Detailed results for current data, innovation leaders, a revealed regional summary innovation index, and cluster analysis for 173 regions in 13 Member States using 13 regional innovation indicators.
- Technical Paper No 4: Sectoral Innovation Scoreboards
  Replicates the EIS for four classes of manufacturing sectors.
- Technical Paper No 5: National Innovation System Indicators
  Includes nine structural and 14 socio-cultural-institutional indicators that shape the background conditions for innovative activity in each EU Member State.
- Technical Paper No 6: Methodology report
  Describes the methodology underlying the EIS, including different methods for calculating a Summary Innovation Index.

All technical papers are available from the Trend Chart website (www.cordis.lu/trendchart).

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[1] A first provisional EIS was published in September 2000: COM(2000) 567. The first full version of the EIS was published in October 2001: SEC(2001) 1414. The second full version was published in December 2002: SEC(2002) 1349.
[2] SEC(2002) 1213.
[3] SEC(2003) 489.

Table of Contents

1 Introduction

This report gives the full results for the Member States, Associate, Acceding and Candidate countries for Trend Chart's fourth annual European Innovation Scoreboard (EIS). The 2003 EIS expands on previous versions of the EIS. Four completely new indicators have been added and six indicators have been split to cover both manufacturing and services.

The four new indicators are as follows:

- *Total EPO and USPTO patents*: This covers patenting in all sectors, thereby expanding coverage to many low technology sectors that are not covered by the indicator for high technology patenting.
- *Early-stage venture capital*: Research shows that a crucial problem for many new firms is to obtain seed or early-stage venture capital. This indicator also covers all venture capital investments, thereby extending coverage to non-high tech areas.
- *Sales from new-to-firm products (but not new-to-market)*: The majority of firm sales from innovative products are from those that are not new to the market, but based on either imitating products first introduced by competitors or by selling-through innovations. This indicator captures this component of innovation as a diffusion process.
- *Firm volatility*: Total firm births plus deaths (averaged over three years between 1998 and 2000). Research in the United States shows that the total churn of firms (births plus deaths) is a strong indicator of innovation through the process of creative destruction. New firms introduce new ideas (births) and can replace existing firms that are unable to adapt quickly enough (deaths).

The six split indicators for manufacturing and services include SMEs innovating in-house (3.1), SMEs involved in innovation cooperation (3.2), total innovation expenditures (3.3), new-to-market sales (4.3.1), new-to-firm sales (4.3.2) and volatility (4.7). All but one (firm volatility) of these split indicators are drawn from CIS-3.

The 2003 EIS includes 20 separate indicators. Once split indicators for services/manufacturing and USPTO/EPO patents are counted, there are 28 indicators in total. The EIS indicators are divided into four categories:

- Human resources for innovation, comprising 5 indicators:
  - 1.1 New S&E graduates (‰ of 20-29 years age class)
  - 1.2 Population with tertiary education (% of 25-64 years age class)
  - 1.3 Participation in life-long learning (% of 25-64 years age class)
  - 1.4 Employment in medium-high and high-tech manufacturing (% of total workforce)
  - 1.5 Employment in high-tech services (% of total workforce)

- The creation of new knowledge, comprising 4 indicators of which two are divided into EPO and USPTO patents:
  - 2.1 Public R&D expenditures (GERD - BERD) (% GDP)
  - 2.2 Business expenditure on R&D (BERD) (% GDP)
  - 2.3.1 EPO high-tech patent applications (per million population)
  - 2.3.2 USPTO high-tech patent applications per million population
  - 2.4.1 EPO patent applications (per million population)
  - 2.4.2 USPTO patents granted (per million population)

- The transmission and application of knowledge, comprising 3 indicators which are divided between manufacturing and services:
  - 3.1 SMEs innovating in-house (% of manufacturing SMEs)
  - 3.1 SMEs innovating in-house (% of services SMEs)
  - 3.2 SMEs involved in innovation co-operation (% of manufacturing SMEs)
  - 3.2 SMEs involved in innovation co-operation (% of services SMEs)
  - 3.3 Innovation expenditures (% of turnover in manufacturing)
  - 3.3 Innovation expenditures (% of turnover in services)

- Innovation finance, outputs and markets, comprising 7 indicators of which three are divided between manufacturing and services:
  - 4.1 Share of high-tech venture capital investment (% of total venture capital)
  - 4.2 Early-stage venture capital investments (% of GDP)
  - 4.3.1 Sales of 'new to market' products (% of turnover in manufacturing)
  - 4.3.1 Sales of 'new to market' products (% of turnover in services)
  - 4.3.2 Sales of 'new to the firm but not new to the market' products (% of turnover in manufacturing)
  - 4.3.2 Sales of 'new to the firm but not new to the market' products (% of turnover in services)
  - 4.4 Internet access/use
  - 4.5 ICT expenditures (% of GDP)
  - 4.6 Share of manufacturing value-added in high-tech sectors (% of manufacturing value-added)
  - 4.7 Volatility rates of SMEs (% of manufacturing SMEs)
  - 4.7 Volatility rates of SMEs (% of services SMEs)

The EIS mainly uses Eurostat data. Six of the 20 EIS indicators are drawn from the EU Structural Indicators. Eight indicators are also used by DG Research under the "Investing in Research" Action Plan for Europe[4].

The 2003 EIS includes the following 32 countries:

- 15 Member States (MS):

  Belgium (BE), Denmark (DK), Germany (DE), Greece (EL), Spain (ES), France (FR), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Austria (AT), Portugal (PT), Finland (FI), Sweden (SE) and United Kingdom (UK).
- 13 Acceding and Candidate countries (ACC):

  Cyprus (CY), Czech Republic (CZ), Estonia (EE), Hungary (HU), Lithuania (LT), Latvia (LV), Malta (MT), Poland (PL), Slovenia (SI) and Slovakia (SK) and the three Candidate countries Bulgaria (BG), Romania (RO) and Turkey (TR).
- 3 Associate countries (AC):

  Switzerland (CH), Iceland (IS) and Norway (NO).
- United States (US) and Japan (JP).

[4] SEC(2003) 489.

2 Main findings from the 2003 EIS

Brief definitions and sources for the 2003 EIS are given in Annex Table A[5]. Annex Table B gives the current 2003 EIS results for all 15 Member States (MS), the US and Japan. Annex Table C gives the current 2003 EIS results for the three Associate countries (AC) and the 13 Acceding and Candidate countries (ACC). Annex Tables D and E give the most recent years used for each indicator by country. Annex Tables F gives the trend results for all MS, the US and Japan. Annex Table G gives the trend results for all AC and ACC. Annex Tables H and I give the base years used for calculating these trends.

2.1 Leaders in current innovation performance

For each of the 28 2003 EIS indicators, Table 1 gives the three leading EU Member States, the three leading Acceding and Candidate countries, the leading Associate country and the results for the EU15, US and Japan. The EU15 leads the US for only one - S&E graduates - of the twelve indicators for which US data are available. The largest gaps are in USPTO patenting (due to the US home advantage), early-stage venture capital, high-tech EPO patents and tertiary education. The EU15 is lagging in all ten indicators that are available for Japan. The largest gaps are in USPTO patenting, business R&D and internet access/use. Of particular concern, business R&D expenditures in both the US and Japan are over 50 percent above the EU15 average.

The Nordic countries of Finland, Sweden and Denmark take up half of the leading EU15 slots. Of the larger EU countries, Germany and the UK are ahead of France and Italy. Italy is the best performing Southern European country[6]. Overall, at least one of the EU leaders is ahead of the US for eight indicators and ahead of Japan for seven indicators. Ireland, France and the UK are leading the US and Japan in S&E graduates; Finland, Sweden and the Netherlands in public R&D and high-tech EPO patents; Sweden and Finland in business R&D; Sweden, Finland and Germany in EPO patents; Sweden and Denmark in internet access/use; Sweden in ICT expenditures; and Ireland and Finland in the value-added share of high-tech manufacturing.

The Acceding and Candidate countries, as a group, lag behind the EU for almost all indicators, although several of them perform above the EU15 average. For half of the indicators, at least one ACC country is above the EU15 mean. This is true for all education indicators, employment in medium-high and high-tech manufacturing, SMEs innovating in-house, SMEs involved in innovation co-operation, innovation expenditures, ICT expenditures, and the value-added share of high-tech manufacturing. In two indicators the ACC leader is even outperforming the EU15 leader: Lithuania in tertiary education and Slovakia in innovation expenditures in manufacturing. The Czech Republic, Estonia, Hungary, Lithuania and Slovenia are the most innovative Acceding countries as measured by the number of leading slots[7].

The Associate countries perform above the EU mean for almost all indicators. For seven indicators, the best associate country outperforms even the EU leader: Norway in tertiary education, Iceland in lifelong learning, public R&D and internet access/use, and Switzerland in USPTO patents, SMEs innovating in-house and ICT expenditures. Switzerland takes 13 of the leading AC slots, Iceland 7 and Norway 6.

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[5] Full definitions of each indicator are available in Technical Paper No 1: Indicators and Definitions.

[6] The full ranking in descending order is: Finland (19); Sweden (15); Germany (9); Denmark (8); UK (6); Netherlands, Portugal (both 4); Belgium, Spain, Italy (all 3), Greece, France, Ireland (all 2); Luxembourg (1) and Austria (0).

[7] Data availability for several ACC is too limited to give a reliable ranking for the number of leading slots.

Table 1. Innovation leaders

No	Indicator	EU mean	EU leaders			ACC leaders			AC leader	US	JP
1.1	S&E graduates / 20-29 years	11.3	21.7 (IE)	19.6 (FR)	19.5 (UK)	13.1 (LT)	8.2 (SI)	7.9 (BG)	9.1 (IS)	10.2	--
1.2	Population with tertiary education	21.5	32.4 (FI)	29.4 (UK)	28.1 (BE)	44.0 (LT)	29.6 (EE)	29.1 (CY)	34.2 (NO)	37.2	33.8
1.3	Participation in lifelong learning	8.4	22.3 (UK)	18.9 (FI)	18.4 (DK)	9.0 (SK)	8.4 (LV)	6.0 (CZ)	23.5 (IS)	--	--
1.4	Employment in med/high-tech manufacturing	7.41	11.36 (DE)	7.39 (FI)	7.37 (IT)	9.28 (SI)	8.94 (CZ)	8.50 (HU)	7.75 (CH)	--	--
1.5	Employment in high-tech services	3.57	5.23 (SE)	4.74 (DK)	4.74 (FI)	3.09 (CZ)	3.06 (MT)	3.06 (HU)	4.81 (IS)	--	--
2.1	Public R&D / GDP	0.69	1.02 (FI)	0.96 (SE)	0.83 (NL)	0.69 (SI)	0.57 (HU)	0.53 (EE)	1.33 (IS)	0.76	0.81
2.2	Business R&D / GDP	1.30	3.31 (SE)	2.47 (FI)	1.76 (DE)	0.94 (SI)	0.78 (CZ)	0.45 (SK)	1.95 (CH)	2.04	2.28
2.3.1	High-tech EPO patents / population	31.6	136.1 (FI)	100.9 (SE)	68.8 (NL)	8.6 (SI)	4.3 (HU)	2.6 (CY)	49.6 (NO)	57.0	44.9
2.3.2	High-tech USPTO patents / population	12.4	47.3 (SE)	41.6 (FI)	22.7 (DK)	2.6 (MT)	0.6 (CY)	0.5 (SI)	21.5 (IS)	91.9	80.0
2.4.1	EPO patents / population	161.1	366.6 (SE)	337.8 (FI)	309.9 (DE)	40.7 (SI)	19.0 (HU)	14.5 (CY)	327.1 (CH)	169.8	174.7
2.4.2	USPTO patents / population	80.1	213.7 (SE)	156.1 (FI)	147.4 (DE)	13.1 (SI)	7.3 (HU)	5.1 (MT)	230.8 (CH)	322.5	265.2
3.1	SMEs innovating in-house – manufacturing [a]	37.4	55.1 (DE)	46.2 (BE)	42.5 (NL)	39.1 (EE)	26.0 (LT)	25.8 (CZ)	58.0 (CH)	--	--
3.1	SMEs innovating in-house – services [a]	28.0	43.9 (DE)	39.6 (LU)	37.6 (PT)	33.5 (EE)	22.7 (CZ)	14.9 (LT)	50.1 (CH)	--	--
3.2	Innovation co-operation – manufacturing SMEs [a]	9.4	22.0 (FI)	18.9 (DK)	14.1 (SE)	12.1 (LT)	11.8 (EE)	8.4 (SI)	13.0 (CH)	--	--
3.2	Innovation co-operation – services SMEs [a]	7.1	18.3 (FI)	12.8 (SE)	12.7 (DK)	12.7 (LT)	11.6 (EE)	5.2 (CZ)	12.1 (NO)	--	--
3.3	Innovation expenditures – manufacturing [a]	3.45	6.42 (SE)	4.92 (BE)	4.71 (DE)	8.80 (SK)	4.20 (SI)	3.65 (LV)	4.29 (CH)	--	--
3.3	Innovation expenditures – services [a]	1.83	19.11 (SE)	2.66 (PT)	1.64 (DE)	7.50 (SK)	2.60 (SI)	1.66 (LV)	2.81 (CH)	--	--
4.1	High-tech venture capital share	45.4	71.2 (IT)	70.7 (FR)	57.5 (FI)	17.5 (PL)	1.6 (HU)	--	59.4 (NO)	--	--
4.2	Early stage venture capital / GDP	0.037	0.098 (SE)	0.087 (FI)	0.080 (DK)	0.019 (CZ)	0.018 (PL)	0.015 (HU)	0.048 (IS)	0.218	--
4.3.1	Sales 'new to market' products – manufacturing [a]	10.5	27.2 (FI)	18.7 (IT)	16.0 (PT)	--	--	--	4.6 (NO)	--	--
4.3.1	Sales 'new to market' products – services [a]	7.4	17.9 (EL)	13.7 (ES)	12.2 (FI)	--	--	--	3.0 (NO)	--	--
4.3.2	Sales 'new to firm' products – manufacturing [a]	28.6	40.3 (DE)	32.1 (SE)	31.1 (FI)	--	--	--	20.7 (CH)	--	--
4.3.2	Sales 'new to firm' products – services [a]	18.8	37.1 (EL)	26.4 (ES)	23.7 (SE)	--	--	--	20.4 (CH)	--	--
4.4	Internet access/use	0.51	0.97 (SE)	0.93 (DK)	0.76 (FI)	0.44 (MT)	0.33 (SI)	0.27 (CY)	1.00 (IS)	0.73	0.88
4.5	ICT expenditures / GDP	7.0	9.8 (SE)	8.6 (UK)	8.3 (NL)	9.6 (EE)	9.5 (CZ)	8.9 (HU)	10.2 (CH)	8.2	9.0
4.6	High-tech manufacturing value-added share	14.1	30.6 (IE)	24.9 (FI)	18.8 (UK)	22.4 (MT)	22.3 (LT)	15.9 (SI)	22.7 (CH)	23.0	18.7
4.7	Volatility rates – manufacturing	12.7	16.0 (UK)	14.2 (ES)	13.3 (PT)	--	--	--	--	--	--
4.7	Volatility rates – services	16.6	20.4 (DK)	20.2 (UK)	18.5 (NL)	--	--	--	--	--	--

[a] Only those countries for which CIS-3 results are available qualify as a potential leader. CIS-3 results for CZ, EE, LT, LV, SI and SK are non-harmonised and thus not directly comparable to those of the EU15, Iceland and Norway. Cf. Technical Paper No 1 for more details.

Table 2. Trend leaders

No	Indicator	EU mean	EU trend leaders			ACC trend leaders			AC trend leader	US	JP
1.1	S&E graduates / 20-29 years	9.1	46.5 (SE)	35.1 (ES)	33.3 (PT)	153.8 (MT)	71.1 (EE)	63.2 (PL)	67.4 (CH)	-3.3	--
1.2	Population with tertiary education	3.3	18.5 (AT)	16.3 (IE)	15.4 (ES)	21.0 (CY)	14.9 (BG)	14.8 (TR)	14.2 (NO)	6.1	9.9
1.3	Participation in lifelong learning	0.6	16.9 (NL)	10.7 (UK)	9.1 (EL)	29.8 (CY)	22.2 (RO)	21.4 (SI)	11.9 (IS)	--	--
1.4	Employment in med/high-tech manufacturing	-3.7	15.6 (LU)	3.0 (DE)	2.1 (FI)	154.8 (LV)	20.0 (SK)	8.1 (SI)	20.9 (IS)	--	--
1.5	Employment in high-tech services	11.5	30.9 (AT)	18.3 (DE)	17.9 (ES)	21.5 (CY)	7.5 (LV)	7.4 (HU)	17.3 (IS)	--	--
2.1	Public R&D / GDP	2.0	34.0 (EL)	8.6 (ES)	7.6 (PT)	42.0 (RO)	36.5 (HU)	17.4 (CZ)	5.3 (IS)	13.4	-2.8
2.2	Business R&D / GDP	4.8	73.7 (PT)	46.0 (EL)	28.4 (DK)	119.4 (LT)	85.8 (TR)	82.4 (LV)	55.2 (IS)	2.7	10.1
2.3.1	High-tech EPO patents / population	63.6	241.1 (EL)	173.9 (IE)	96.9 (PT)	309.3 (SI)	286.9 (CY)	226.0 (HU)	294.7 (NO)	76.6	52.1
2.3.2	High-tech USPTO patents / population	43.9	116.4 (ES)	95.7 (SE)	77.1 (DK)	--	--	--	94.6 (NO)	41.9	21.6
2.4.1	EPO patents / population	25.3	70.3 (PT)	52.1 (IE)	39.9 (DK)	99.3 (EE)	93.8 (SI)	93.5 (LT)	151.6 (NO)	30.9	41.8
2.4.2	USPTO patents / population	28.1	90.7 (PT)	68.7 (LU)	66.7 (IE)	534.4 (EE)	284.8 (MT)	126.1 (TR)	178.1 (IS)	13.3	16.2
4.2	Early stage venture capital / GDP	10.4	531.6 (DK)	85.1 (SE)	83.3 (EL)	--	--	--	76.0 (NO)	188.7	--
4.5	ICT expenditures / GDP	15.5	21.2 (EL)	18.3 (DE)	17.8 (IT)	40.5 (PL)	38.9 (SK)	34.7 (RO)	18.6 (CH)	4.9	14.7
4.6	High-tech manufacturing value-added share	12.0	19.1 (FI)	17.6 (DE)	16.0 (BE)	30.6 (TR)	27.0 (BG)	18.3 (HU)	9.0 (NO)	7.0	12.0

2.2 Current trends and evolutions of the EU15/US gap

Not for all indicators reliable time series data are available to calculate trends. Trend results are available for 14 indicators for the Member States and the AC, for 12 indicators for the ACC, for indicators 11 for the US, and for 9 indicators for Japan[8]. Table 2 gives the three EU15 trend leaders, the three leading ACC trend leaders, the AC trend leader and the trend results for the EU15, US and Japan.

The EU15 trends are positive for most indicators, but there is a worrisome decline for S&E graduates, tertiary education, lifelong learning and high-tech EPO patents compared to the 2002 EIS[9]. An increase in trends can only be seen for public R&D and, to a lesser extent, for ICT expenditures. Of note, the trend for the employment share in medium-high and high-tech manufacturing is negative in the EU15 but positive in several ACC countries. This may reflect the relocation of some medium-high and high-tech manufacturing from Member States to the ACC.

Compared to the US, the EU15 trend is higher for six indicators (S&E graduates, business R&D, high-tech USPTO patents, USPTO patents, ICT expenditures and the value-added share of high-tech manufacturing) but lower for five indicators (tertiary education, public R&D, high-tech EPO patents, EPO patents and early stage venture capital). Figure 1 graphs the difference between the US and the EU15 for each of these 11 comparable indicators. The respective US and EU15 trends in public and business R&D are of particular concern, suggesting that the gap between the EU15 and the US may increase even further. For many of the indicators shown in Figure 1, there is a large and persistent gap between the EU15 and the US.

Although the EU15 leaders for current performance are located in Northern Europe, the EU15 trend leaders are found in Southern Europe. Greece, Spain and Portugal lead trends in at least five indicators[10]. The EU15 trend leaders are outperforming the US and Japan in all indicators for which trend data are available. Part of the explanation is that some of the EU15 trend leaders are improving from very low starting points.

For the ACC, three countries are leading in three indicators and five countries leading in two indicators. Slovenia, Cyprus, Hungary and Turkey are trend leaders in four indicators each[11]. The Associate countries show an above EU15 trend performance in almost all indicators. Iceland shows an increase of over 100% in USPTO patents (due to a highly specialised "niche" strategy focused on biotechnology innovation) and Norway in both EPO patent indicators. Trend leadership is almost equally shared by Iceland and Norway, and for five indicators at least one Associate country is growing faster than the EU15 trend leader.

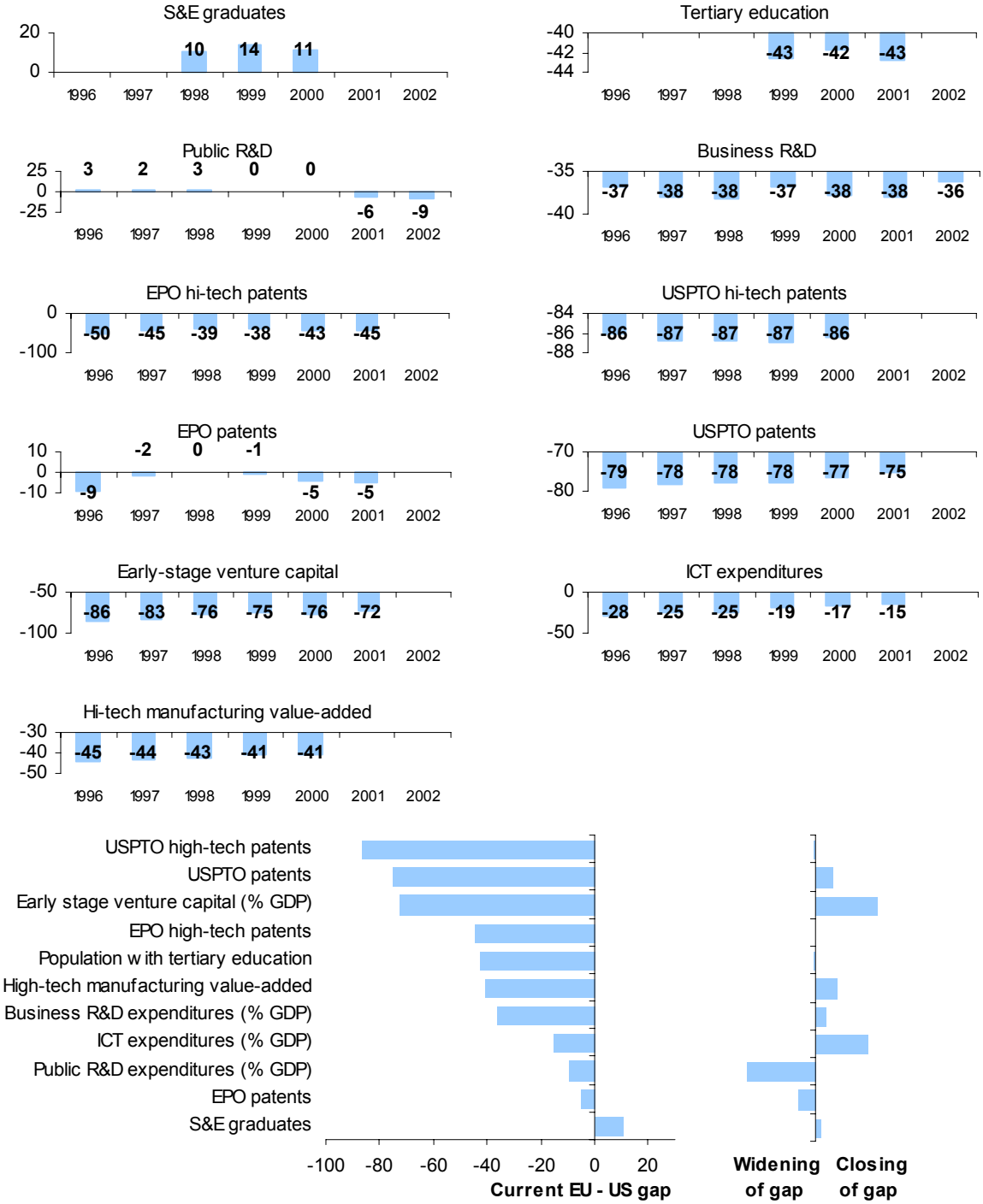
[8] For all trend results see tables F and G in the annex. The calculation method for trends is explained in Technical Annex A.2.

[9] The 2002 EIS trend results for the EU15 were: 13.7 for S&E graduates; 17.9 for tertiary education; 21.4 for lifelong learning; -2.1 for employment in medium-high and high-tech manufacturing; 18.3 for employment in high-tech services; -2.0 for public R&D; 5.4 for business R&D; 97.2 for high-tech EPO patents; 43.0 for USPTO patents; 14.8 for ICT expenditures; and 23.2 for the value-added share of high-tech manufacturing.

[10] The full ranking is: Greece, Portugal (both 6); Spain (5); Denmark, Germany, Ireland (all 4); Sweden (3); Luxembourg, Austria, Finland (all 2); Belgium, Italy, Netherlands, UK (all 1) and France (0).

[11] The full ranking is: Cyprus, Hungary, Slovenia, Turkey (all 4); Estonia, Latvia, Romania (all 3); Bulgaria, Lithuania, Malta, Poland, Slovakia (all 2) and Czech Republic (1).

Figure 1. EU15 - US gap for 11 innovation indicators



Gaps are calculated as percentage differences (100*((EU15/US)-1). A positive value indicates that the EU15 leads the US, while a negative value indicates that the EU15 lags behind the US. Closing/widening of gap reflects differences in EU15 - US trend performance.

2.3 Relative strengths and weaknesses

Table 3 summarizes the relative strengths and weaknesses of each country. The results are limited to a maximum of the three best and three worst current indicator values or trends[12]. Table 4 gives full results for all countries.

Table 3. Relative strengths and weaknesses

Country	Major relative strengths	Major relative weaknesses
Belgium (BE)	Current and trend for tertiary education (1.2; trend for lifelong learning (1.3); innovation expenditures in manufacturing (3.3)	Trend for EPO high-tech patents (2.3.1); innovation expenditures in services (3.3); trend for early-stage venture capital (4.2)
Denmark (DK)	Current lifelong learning (1.3); current and trend for USPTO high-tech patents (2.3.2); current and trend for early-stage venture capital (4.2)	Trend for lifelong learning (1.3); SMEs innovating in-house (3.1); innovation expenditures (3.3)
Germany (DE)	Current and trend for med/high-tech manufacturing employment (1.4); current EPO high-tech patents (2.3.1); current patents (2.4.1 and 2.4.2)	Trend for education (1.1 and 1.2); current education (1.1 and 1.3); sales of new-to-market products in manufacturing (4.3.1)
Greece (EL)	Trend for public and business R&D (2.1 and 2.2); trend for EPO hi-tech patents (2.3.1); sales of new-to-market products in manufacturing (4.3.1)	Current high-tech patents (2.3.1 and 2.3.2); current patents (2.4.1 and 2.4.2); internet access/use (4.4)
Spain (ES)	Trend for education (1.1 and 1.2); trend for public and business R&D (2.1 and 2.2); trend for USPTO high-tech patents (2.3.2); sales of new-to-market products in manufacturing (4.3.1)	Current high-tech patents (2.3.1 and 2.3.2); current patents (2.4.1 and 2.4.2); trend for manufacturing high-tech value-added (4.6)
France (FR)	Current S&E graduates (1.1); trend for tertiary education (1.2); high-tech venture capital (4.1)	Current lifelong learning (1.3); trend for USPTO high-tech patents (2.3.2); sales of new-to-market products (4.3.1)
Ireland (IE)	Trend for tertiary education (1.2); trend for EPO high-tech patents (2.3.1); current manufacturing high-tech value-added (4.6)	Current and trend for USPTO high-tech patents (2.3.2); trend for early-stage venture capital (4.2); trend for ICT expenditures (4.5)
Italy (IT)	Trend for education (1.1 and 1.2); high-tech venture capital (4.1); sales of new-to-market products (4.3.1)	Trend for lifelong learning (1.3); current and trend for EPO and USPTO high-tech patents (2.3.1 and 2.3.2); innovation co-operation (3.2)
Luxembourg (LU)	Trend for S&E graduates (1.1); trend for med/high-tech manufacturing employment (1.4); current and trend for USPTO patents (2.4.2)	Current S&E graduates (1.1); current public R&D (2.1); current manufacturing high-tech value-added (4.6)
Netherlands (NL)	Trend for tertiary education (1.2); current and trend for lifelong learning (1.3); current high-tech patents (2.3.1 and 2.3.2)	Current S&E graduates (1.1); trend for USPTO high-tech patents (2.3.2); innovation expenditures in services (3.3); trend for early-stage venture capital (4.2)
Austria (AT)	Trend for tertiary education (1.2); trend for USPTO high-tech patents (2.3.2); trend for early-stage venture capital (4.2)	Trend for lifelong learning (1.3); early stage venture capital (4.2); trend for manufacturing high-tech value-added (4.6)
Portugal (PT)	Trend for S&E graduates (1.1); trend for business R&D (2.2); trend for patents (2.4.1 and 2.4.2)	Current business R&D (2.2); current high-tech patents (2.3.1 and 2.3.2); current patents (2.4.1 and 2.4.2)
Finland (FI)	Current high-tech patents (2.3.1 and 2.3.2); innovation co-operation (3.2); sales of new-to-market products in manufacturing (4.3.1)	Trend for EPO high-tech patents (2.3.1); innovation expenditures in services (3.3); trend for ICT expenditures (4.5)

[12] Only current indicator values and trend results more than 20% above or below the EU mean are taken into account. These are then ranked in descending/ascending order to determine the three best or worst performing indicators. For determining best and worst trends, trend results have first been re-scaled. Cf. Technical Paper No 6 for definitions.

Country	Major relative strengths	Major relative weaknesses
Sweden (SE)	Current high-tech patents (2.3.1 and 2.3.2); current patents (2.4.1 and 2.4.2); innovation expenditures in services (3.3); current and trend for early-stage venture capital (4.2)	Trend for tertiary education (1.2); trend for med/high-tech manufacturing employment (1.4); sales of new-to-market products in manufacturing (4.3.1); trend for manufacturing hi-tech value-added (4.6)
United Kingdom (UK)	Current and trend for education (1.1 and 1.3); trend for EPO high-tech patents (2.3.1); trend for early-stage venture capital (4.2)	Trend for med/high-tech manufacturing employment (1.4); trend for USPTO high-tech patents (2.3.2); SMEs innovating in-house (3.1)
Switzerland (CH)	Trend for S&E graduates (1.1); current lifelong learning (1.3); current patents (2.4.1 and 2.4.2)	Current S&E graduates (1.1); trend for public R&D (2.2); trend for USPTO high-tech patents (2.3.2)
Iceland (IS)	Current lifelong learning (1.3); trend for business R&D (2.2); trend for USPTO high-tech patents (2.3.2)	Current med/high-tech manufacturing employment (1.4); trend for early-stage venture capital (4.2); sales of new-to-market and new-to-firm products (4.3.1 and 4.3.2)
Norway (NO)	Current and trend for tertiary education (1.2); current and trend for all EPO patents (2.3.1 and 2.4.1); trend for USPTO high-tech patents (2.4.1)	Trend for public R&D (2.1); sales of new-to-market products (4.3.1); trend for ICT expenditures (4.5); current manufacturing high-tech value-added (4.6)
Bulgaria (BG)	Trend for education (1.1 and 1.2); trend for manufacturing high-tech value-added (4.6)	Current business R&D (2.2); current high-tech patents (2.3.1 and 2.3.2); current and trend for patents (2.4.1 and 2.4.2)
Cyprus (CY)	Trend for education (1.2 and 1.3); trend for EPO high-tech patents (2.3.1); trend for patents (2.4.1 and 2.4.2)	Current med/high-tech manufacturing employment (1.4); current business R&D (2.2); all current patents (2.3.1, 2.3.2, 2.4.1 and 2.4.2)
Czech Republic (CZ)	Trend for education (1.1 and 1.2); trend for public R&D (2.1); current and trend for ICT expenditures (4.5)	Current and trend for EPO high-tech patents (2.3.1); current patents (2.4.1 and 2.4.2)
Estonia (EE)	Trend for S&E graduates (1.1); trend for business R&D (2.2); trend for EPO high-tech patents (2.3.1); trend for patents (2.4.1 and 2.4.2)	Trend for lifelong learning (1.3); current EPO high-tech patents (2.3.1); current patents (2.4.1 and 2.4.2)
Hungary (HU)	Trend for R&D expenditures (2.1 and 2.2); trend for EPO high-tech patents (2.3.1); current and trend for ICT expenditures (4.5)	Trend for S&E graduates (1.1); USPTO high-tech patents (2.3.2); high-tech venture capital (4.1); internet access/use (4.4)
Lithuania (LT)	Current education (1.1 and 1.2); trend for business R&D (2.2); trend for EPO patents (2.4.1)	Trend for med/high-tech employment (1.4 and 1.5); all current patents (2.3.1, 2.3.2, 2.4.1 and 2.4.2); internet access/use (4.4)
Latvia (LV)	Trend for med/high-tech manufacturing employment (1.4); trend for business R&D (2.2); trend for EPO patents (2.4.1)	Current EPO high-tech patents (2.3.1); current and trend for USPTO patents (2.4.2); internet access/use (4.4)
Malta (MT)	Trend for S&E graduates (1.1); trend for USPTO patents (2.4.2); internet access/use (4.4)	Current S&E graduates (1.1); current and trend for EPO high-tech patents (2.3.1); current patents (2.4.1 and 2.4.2)
Poland (PL)	Trend for education (1.1 and 1.2); trend for EPO patents (2.4.1); trend for ICT expenditures (4.5)	All current patents (2.3.1, 2.3.2, 2.4.1 and 2.4.2); internet access/use (4.4)
Romania (RO)	Trend for education (1.2 and 1.3); trend for public R&D (2.1); trend for USPTO patents (2.4.2)	Trend for business R&D (2.2); all current patents (2.3.1, 2.3.2, 2.4.1 and 2.4.2)
Slovenia (SI)	Trend for lifelong learning (1.3); current and trend for med/high-tech manufacturing employment (1.4); trend for all EPO patents (2.3.1 and 2.4.1)	Trend for tertiary education (1.2); current USPTO high-tech patents (2.4.2); SMEs innovating in-house in services (3.1)
Slovakia (SK)	Trend for S&E graduates (1.1); trend for EPO high-tech patents (2.3.1); innovation expenditures (3.3)	Trend for public R&D (2.1); current USPTO high-tech patents (2.3.2); current and trend for USPTO patents (2.4.2)
Turkey (TR)	Trend for tertiary education (1.2); trend for business R&D (2.2); trend for USPTO patents (2.4.2)	Current med/high-tech manufacturing employment (1.4); all current patents (2.3.1, 2.3.2, 2.4.1 and 2.4.2)

Table 4 Strengths and weaknesses

		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3.1	2.3.2	2.4.1	2.4.2	3.1 MAN	3.1 SER	3.2 MAN	3.2 SER	3.3 MAN	3.3 SER	4.1	4.2	4.3.1 MAN	4.3.1 SER	4.3.2 MAN	4.3.2 SER	4.4	4.5	4.6	4.7 MAN	4.7 SER
BE	Level	89	**131**	*77*	89	106	83	**123**	*74*	111	94	117	**123**	114	**124**	109	**143**	*50*	118	109	*65*	99	*55*	**125**	114	104	93	85	101
	Trend		**142**	**140**	*79*	88	111	**131**	*55*	102	*78*	96								*41*						94	117		
DK	Level	98	**128**	**219**	85	**133**	109	**127**	**133**	**182**	**131**	**132**	*44*	*55*	**201**	**180**	*28*	*20*	*68*	**216**	**136**	101	85	98	**181**	106	106	100	**123**
	Trend	**150**	**124**	*48*	99	*79*	94	**159**	110	**249**	**130**	90								**674**						*59*	100		
DE	Level	*71*	104	*62*	**153**	93	106	**135**	**155**	**132**	**192**	**184**	**147**	**157**	116	119	**137**	89		112	*67*	*49*	**141**	87	**128**	99	84		
	Trend	*48*	*29*	82	**130**	118	87	112	104	**127**	100	106								92						112	**125**		
EL	Level		82	*14*	*30*	*49*	*70*	*15*	*7*	*3*	*5*	*4*	*45*	*76*	*52*	**176**	*64*	87	*61*	*45*	*42*	**240**	*64*	**197**	*10*	*73*	*45*		
	Trend		111	**148**	102	105	**217**	**204**	**429**		*75*	**126**								**180**						**124**	*48*		
ES	Level	100	113	*60*	*72*	*70*	*67*	*38*	*11*	*11*	*15*	*11*	*78*	*59*	*34*	*27*	*54*	*35*	*66*	*43*	114	**184**	90	**140**	*49*	*64*	*46*	112	103
	Trend	**173**	**208**	116	107	117	**124**	**121**	102	**424**	86	98								100						*78*	*20*		
FR	Level	**173**	109	*32*	92	114	**120**	105	96	113	90	96	90	85	**130**	*76*	89	86	**156**	95	91	*74*	*61*	91	98	105	**130**		
	Trend	99	**185**	97	96	91	101	89	*77*	*12*	87	88								92						96	96		
IE	Level	**191**	118	92	93	**121**	*54*	*67*	97	*49*	*53*	*61*							119	*73*					108	*75*	**216**		
	Trend	*70*	**216**		91	93	113	*71*	**304**	*30*	**155**	**144**								*49*						*27*	*48*		
IT	Level	*50*	*48*	*55*	99	85	*78*	*43*	*20*	*33*	*46*	*41*	93	*72*	*29*	*50*	86	*46*	**157**	*39*	**178**	**155**	105	109	*75*	*74*	*70*	101	104
	Trend	**132**	**169**	*25*	102	97	110	109	*25*	*17*	86	92								*68*						110	90		
LU	Level	*16*	87	*63*	*27*	*75*	*19*	**122**	*34*	*37*	**131**	**144**	104	**141**			*60*	*64*				*36*	*48*	*48*	115	115	*22*	101	
	Trend	**154**	86	**123**	**188**	*44*			*74*		112	**146**														*50*	*76*		
NL	Level	*54*	116	**195**	*61*	**123**	**120**	83	**218**	**149**	**151**	**123**	114	101	117	120	89	*43*	*77*	119			83	*74*	**144**	119	85	101	112
	Trend	84	**149**	**192**	*76*	104	*54*	83	119	*9*	119	91								*46*						84	86		
AT	Level	*64*	*79*	89	89	97	94	87	*59*	*65*	108	103	95	**130**	*78*	**143**	82	*50*	**123**	*45*	80	*58*	81	*68*	**132**	90	81		
	Trend	*73*	**236**	*18*	115	**152**			**132**	**191**	115	109								**170**						109	*55*		
PT	Level	*56*	*44*	*35*	*45*	*41*	83	*21*	*2*	*1*	*3*	*2*	95	**134**	*65*	**129**	83	**145**	101	*28*	**152**	**127**	*76*	86	*50*	*78*	*46*	105	88
	Trend	**168**	102	*49*	84	108	**121**	**273**	**162**		**192**	**171**								*64*						*75*	*76*		
FI	Level	**141**	**151**	**225**	100	**133**	**148**	**190**	**431**	**334**	**210**	**195**	109	**125**	**233**	**259**	113	*52*	**127**	**235**	**259**	**164**	109	100	**149**	97	**176**	98	95
	Trend	95	114	**133**	**126**	88	105	**121**	*55*	**208**	113	105								**152**						*68*	**131**		
SE	Level	109	**123**	**219**	98	**147**	**139**	**255**	**320**	**380**	**228**	**267**	95	**127**	**149**	**181**	**186**	**1042**	97	**264**	*34*	**125**	112	**126**	**189**	**140**	112	81	*80*
	Trend	**204**	*0*		*63*	96	**120**	**143**	91	**332**	99	**125**								**182**						91	*0*		
UK	Level	**172**	**137**	**265**	91	**125**	94	92	113	**121**	83	96	*66*	*67*	102	108	86	*76*	*67*	**127**	91				104	**124**	**133**	**126**	**122**
	Trend	**156**	**122**	**157**	*65*	94	111	82	**144**	*63*	114	95								**153**						90	102		
CH	Level	*67*	117	**217**	105	111	99	**150**		**171**	**203**	**288**	**155**	**179**	**138**	92	**124**	**153**	111	*67*			*72*	109		**146**	**160**		
	Trend	**263**	**134**		99	84	*38*	90		*3*	109	*76*								93						113	*72*		
IS	Level	80	119	**280**	*27*	**135**	**193**	**137**	98	**173**	*73*	106	120	**173**	118		*25*	**125**	113	**128**	*17*	*13*	*31*	*16*	**195**	**133**			
	Trend	**158**	**180**	**164**	**212**	116	112	**227**	93		**123**	**270**								*0*									

		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3.1	2.3.2	2.4.1	2.4.2	3.1 MAN	3.1 SER	3.2 MAN	3.2 SER	3.3 MAN	3.3 SER	4.1	4.2	4.3.1 MAN	4.3.1 SER	4.3.2 MAN	4.3.2 SER	4.4	4.5	4.6	4.7 MAN	4.7 SER
NO	Level	*76*	**159**	**158**	*62*	115	94	*75*	**157**	*66*	**179**	85	86	94	**134**	**171**	*60*	*56*	**131**	96	*44*	*41*	*64*	*59*	**138**	81	*57*		
	Trend	107	**197**	97	101	94	*57*	100	**528**	**327**	**357**	116								**172**						*0*	86		
US	Level	90	**173**				110	**157**	**181**	**739**	105	**403**								**588**					**142**	118	**163**		
	Trend	*65*	**125**				**142**	95	**124**	91	111	83								**296**						*56*	*78*		
JP	Level		**157**				117	**175**	**142**	**643**	108	**331**													**172**	**129**	**132**		
	Trend		**159**				82	113	*79*	*0*	**134**	87														97	100		
BG	Level	91	107	*22*	*76*	90	*67*	*15*	*5*	*5*	*5*	*4*														*57*	*40*		
	Trend	**163**	**204**		93	84	*42*	*51*	117		*0*	*70*														108	**166**		
CY	Level	*38*	**148**	*63*	*16*	*64*	*40*	*8*	*39*	*25*	*37*	*17*													100				
	Trend	*32*	**258**	**266**	114	**127**	**133**	**138**	**514**		**175**	**178**																	
CZ	Level	*64*	*60*	103	**127**	104	95	117	*10*		*27*	*20*	88	104	*67*	87	*39*	*39*		89					*49*	**144**			
	Trend	**159**	**133**		**123**	*68*	**157**	91	*37*		89	*74*														**176**			
EE	Level	84	**151**	89	*48*	97	97	*39*	*22*		*28*	*15*	**134**	**154**	**137**	**193**	*70*	*36*							*42*	**145**			
	Trend	**273**	*73*	*0*	*56*	*75*	93	**271**	**228**		**251**	**674**														93			
HU	Level	*42*	*72*	*57*	**121**	103	104	*57*	*64*	*13*	*48*	*48*							*8*	*70*					*2*	**135**	101		
	Trend	*0*	88	**133**	**126**	89	**227**	**179**	**401**		**146**	98														**170**	**128**		
LT	Level	**150**	**224**	*57*	*38*	*57*	89	*30*	*10*	*11*	*6*	*9*	89	*68*	**140**	**212**	81	*43*							*5*	89	**152**		
	Trend	**206**	113	88	*0*	*0*	115	**388**	*7*		**239**	117														**163**			
LV	Level	87	99	**144**	*28*	*76*	*51*	*24*	*6*		*19*	*6*	*65*	*51*	*47*	*63*	95	94							*0*	119			
	Trend	**129**	**170**		**821**	89	*32*	**295**	*38*		**201**	*2*																	
MT	Level	*38*		*75*	102	103			*22*	110	*26*	*34*	*53*		*57*										**164**	*62*	**153**		
	Trend	**504**							*0*		106	**391**															*22*		
PL	Level	85	*62*	*74*	107		*78*	*36*	*3*	*2*	*6*	*7*	*14*				106		85	84					*31*	89			
	Trend	**251**	**156**				92	*40*	*64*		**158**	*66*														**204**			
RO	Level	*56*	*51*	*19*	*78*	*53*	*27*	*38*	*2*		*2*	*3*								*19*						*33*			
	Trend	84	**182**	**223**	103	85	**247**	*0*	*56*		*16*	**205**														**180**			
SI	Level	94	*75*	87	**132**	*79*	**126**	**142**	**128**	*21*	103	87	*75*	*58*	97	*73*	109	**147**							**123**	*71*	108		
	Trend	98	*47*	**218**	**154**	80	95	**138**	**555**		**239**	**128**														**130**			
SK	Level	85	*55*	**154**	117	95	*40*	*68*	*16*	*8*	*15*	*5*	*48*	*46*	*51*	*27*	**228**	**423**		*56*						113			
	Trend	**229**	**128**		**208**	*64*	*0*	*12*	**309**		113	*0*														**198**			
TR	Level		*45*		*17*		*66*	*41*	*3*	*1*	*3*	*3*	84		**209**											*54*	*45*		
	Trend		**203**		**126**		109	**303**	**124**		115	**211**														*43*	**182**		

Strengths are given in **bold**, weaknesses in *italic*. Strengths/weaknesses for current performance are defined as being 20% above/below the EU15 mean. For trends re-scaled values have been used to identify strengths and weaknesses. Strengths/weaknesses for trend performance are defined as being 20% above/below the EU15 mean.

2.4 The 2003 Summary Innovation Index

The 2002 EIS did not include a Summary Innovation Index (SII) because it was not possible to update the four indicators using CIS data. This year, with new results from CIS-3, the EIS again includes a SII. However, there is a marked difference in data availability between the various countries. Data are missing for many indicators for the Acceding and Candidate countries, the US and Japan. Therefore two composite indicators have been calculated:

- The SII-1, covering all indicators, is provided for the Member States, Switzerland, Iceland and Norway.
- The SII-2 is calculated for all countries, using twelve widely available indicators: these include all five human resources indicators, all six knowledge creation indicators and ICT expenditures.

The method of calculating the 2003 SII has changed compared to the 2001 EIS. The current version rescales each indicator to vary between 0 and 1 and then takes a weighted average of these re-scaled values[13].

Figure 2. 2003 SII-1

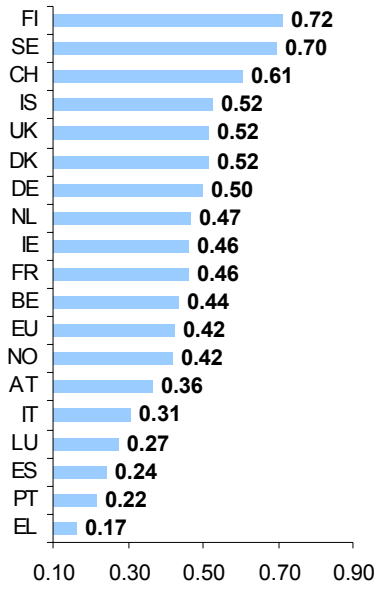


Figure 3. Overall country trend by SII-1

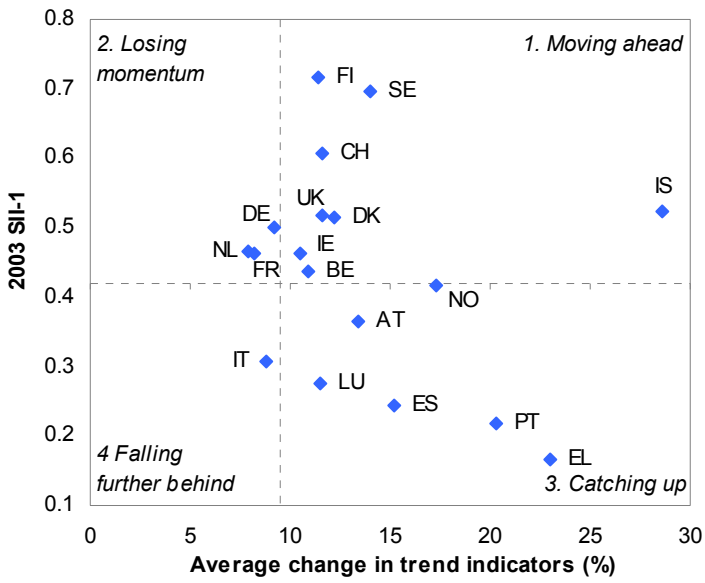


Figure 2 shows the results for the 2003 SII-1. Finland and Sweden have by far the highest SII-1 and are confirmed as the European innovation leaders. Spain, Portugal and Greece show the weakest innovation performance. Compared to the 2001 SII, Germany and Italy show the strongest *short-term* improvement, increasing respectively from seventh to fifth and from thirteenth to eleventh position[14]. Switzerland and Iceland are the two leading Associate countries and follow, together with the UK and Germany, most closely behind the two innovation leaders.

[13] This technique for estimating composite indicators was discussed in detail in EIS 2002 Technical Paper No 6: Methodology Report. Not all indicators receive the same weight. For a brief explanation see Annex A.3. For a more detailed explanation see EIS 2003 Technical Paper No 6.

[14] This improvement is not due to the changed methodology in calculating the SII. Germany's rank improvement is fully explained by the change in the set of indicators. Italy's rank improvement is fully explained by a real improvement as shown by a direct comparison between the 2001 SII and a 2003 SII using only those indicators used in the 2001 EIS. Cf. Technical Paper No 6.

Figure 3 graphs current performance on the SII-1 (vertical axis) against the average trend performance (horizontal axis)[15]. Greece, Portugal and Spain are the best examples of countries catching-up from low current values. Sweden, Finland and Iceland are moving ahead, with above average current and trend performance. The Netherlands, France and Germany are in danger of losing momentum. Although their current performance is above the EU15 average, their average trends lag behind other countries. In comparison with the 2001 SII, Portugal and Austria shifted from a "falling further behind" to a "catching up" situation. Of concern, Italy continues (as in the 2001 EIS) to fall further behind the other EU15 countries.

Figure 4. 2003 SII-2

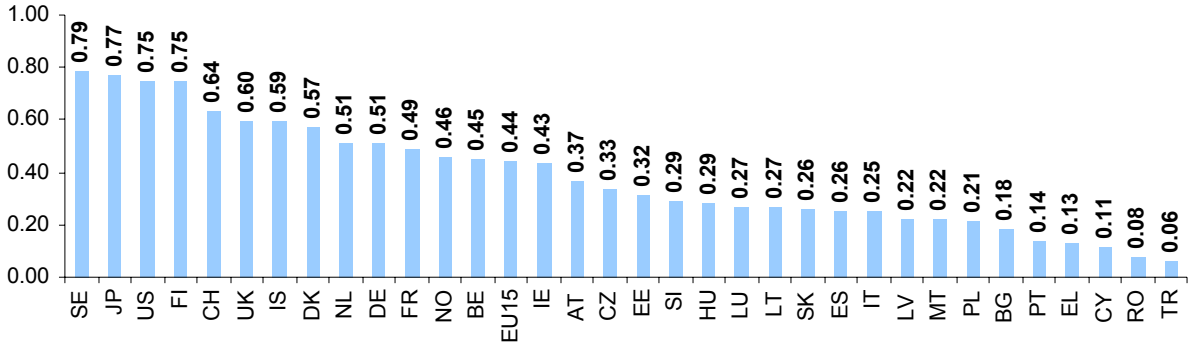
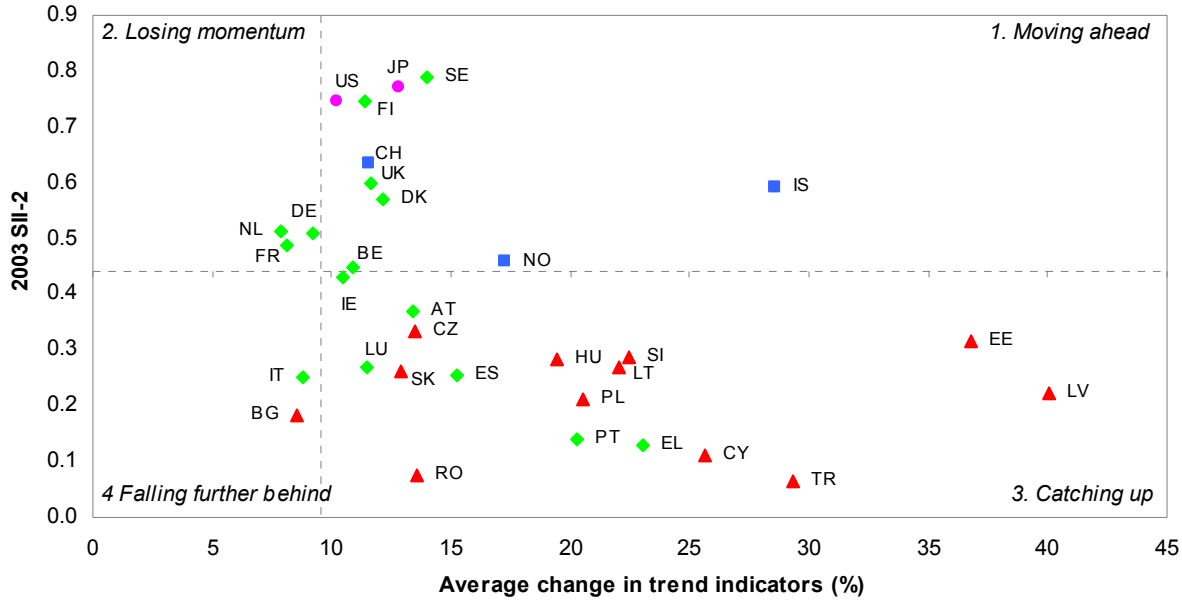


Figure 4 gives the SII-2 results for all countries. Sweden and Finland, as in the more detailed SII-1, are the innovation leaders within Europe. Of note, several ACC countries rank higher than several EU15 Member States. The Czech Republic, Estonia, Slovenia and Hungary show a higher SII-2 score than five EU15 countries and Lithuania and Slovakia show a higher SII-2 score than four EU15 countries. Only Cyprus, Romania and Turkey lag behind all EU15 countries.

Figure 5. Overall country trend by SII-2



[15] Cf. Technical Annexes A.1 and A.2 for definitions of indicator trends and average country trend.

Figure 5 graphs current and trend performances for all countries[16]. The SII-2 shows an overall positive "catching-up" pattern for Acceding countries. But this picture should not hide the existence of serious problems. Although most Acceding countries show a stronger growth performance than the EU15, a large part of this growth is due to the fact that for several indicators these countries have started from very low starting values. Moreover, both public and private R&D spending is falling in several Acceding countries, even though current performance is far below the EU15 average. Consequently, the positive trends for the Acceding countries may not be sustainable in the near future.

2.5 Convergence and divergence in innovation performance

In order to achieve the goal of becoming the world's most innovative economy by 2010, the innovative performance of the lagging EU economies will need to catch up to that of the leaders. This raises two questions: by how much does trend performance vary between the EU countries and have these trends been converging?

Table 5 gives a measure of the amount of variation for each indicator and a measure of convergence for the fourteen indicators with reliable trend data: the percentage change in the standard deviation across EU countries over the time period. Convergence *increases* as the change in the standard deviation declines. The highest variation between the Member States is, as in the 2002 EIS, in EPO and USPTO high-tech patents and lifelong learning. The lowest variation[17] is in ICT expenditures, new-to-the-firm sales in manufacturing, SMEs innovating in-house in manufacturing and public R&D. Based on the CIS- and volatility indicators, variation in innovation performance is not different between manufacturing and services.

In the 2002 EIS, the variation in public R&D was less than half that in business R&D. With public R&D converging and business R&D diverging[18], the difference in variation between these two has increased further. For seven indicators innovation performance within the EU15 is converging, for seven indicators it is diverging. Compared to last year, it seems that on average innovation performance is diverging within the EU15[19]. Three indicators are showing very high rates of divergence (above 10%): high-tech USPTO patents, early-stage venture capital and business R&D. Two indicators are showing high rates of convergence (less than -10%): high-tech EPO patents and public R&D. Although the results in Table 5 are based on a small number of countries, the average percentage change in the amount of variation suggests an increase of divergence innovation performance within the EU15.

[16] Malta is not included as this country has less than 6 trend results.
[17] The indicators on volatility rates are excluded as data availability is below that of the other indicators.
[18] Business R&D is diverging, as the leading countries are growing faster than the EU average. In this case divergence helps increasing the EU15 mean and as such is a desirable development.
[19] In the 2002 EIS, for 6 indicators innovation performance was converging (S&E graduates, tertiary education, lifelong learning, public R&D, home internet access and high-tech manufacturing value-added), for 3 it was diverging (employment in medium-high and high-tech manufacturing, business R&D and high-tech USPTO patents) and for 3 it was neither converging nor diverging (employment in high-tech services, high-tech EPO patents and ICT expenditures).

Table 5. Variation and convergence of indicators between Member States

No	Indicator	Variation[1]		Convergence[2]		# Ctrs
1.1	S&E graduates	Medium	52.9	Converging	-3.4	13
1.2	Population with tertiary education	Low	30.0	Converging	-2.0	15
1.3	Lifelong learning	High	82.7	Diverging	5.7	13
1.4	Employment in med/high-tech manufacturing	Low	30.6	Diverging	1.8	15
1.5	Employment in hi-tech services	Low	30.7	Converging	-6.2	15
2.1	Public R&D expenditures	Low	27.7	Converging	-10.1	13
2.2	Business R&D expenditures	Medium	66.0	Diverging	13.0	13
2.3.1	EPO high-tech patents	High	118.5	Converging	-11.1	15
2.3.2	USPTO high-tech patents	High	108.5	Diverging	29.8	12
2.4.1	EPO patents	Medium	69.5	Diverging	2.4	15
2.4.2	USPTO patents	High	72.5	Diverging	9.3	15
3.1	SMEs innovating in-house manufacturing	Low	27.1	--	--	14
3.1	SMEs innovating in-house services	Low	32.6	--	--	14
3.2	SMEs innovation co-operation manufacturing	Medium	58.4	--	--	13
3.2	SMEs innovation co-operation services	Medium	58.8	--	--	13
3.3	Innovation expenditures manufacturing	Medium	39.2	--	--	14
3.3	Innovation expenditures services	Medium	51.9	--	--	14
4.1	Hi-tech venture capital	Low	32.1	--	--	13
4.2	Early stage venture capital	High	74.2	Diverging	15.4	14
4.3.1	New-to-market sales manufacturing	Medium	61.4	--	--	12
4.3.1	New-to-market sales services	Medium	58.0	--	--	12
4.3.2	New-to-firm sales manufacturing	Low	25.2	--	--	13
4.3.2	New-to-firm sales services	Medium	36.3	--	--	13
4.4	Internet access/use	Medium	47.4	--	--	15
4.5	ICT expenditures	Low	21.1	Converging	-5.9	15
4.6	Value-added share high-tech manufacturing	Medium	50.3	Converging	-5.7	15
4.7	Volatility manufacturing	Low	12.0	--	--	10
4.7	Volatility services	Low	13.5	--	--	9

1: Coefficient of variation or CV (standard deviation/mean*100) among the EU Member States for the most recent available data, using unweighted means. The classification of 'low', 'medium', and 'high' variation is based on the clustering of the CVs. All low CVs are below 35, the medium CVs lie between 35 and 70, and the high CVs are above 70.

2: The percentage change in the standard deviation across EU countries over the first and second time period. The first time period equals the average over the three years before the one-year lag. The second time period is the most recent year for which data are available. A percentage change within plus or minus 1% is assumed to be neither converging nor diverging.

3 National innovation "paths"

3.1 Innovation in services

The importance of services to overall value-added and employment is an indicator for economic progress and the overall shape of any national innovation system. The relative contribution of services to business R&D is another discriminator. In many EU countries, increasing R&D expenditures in services has also driven growth in business R&D. For the EU the share of services in business R&D has increased from 8% in 1992 to 13% in 1999. In the US services take up an even bigger share of business R&D with 34% in 2000 (24% in 1992). Japan presents a contrasting picture with a 2% share in 2000 (0.2% in 1992).

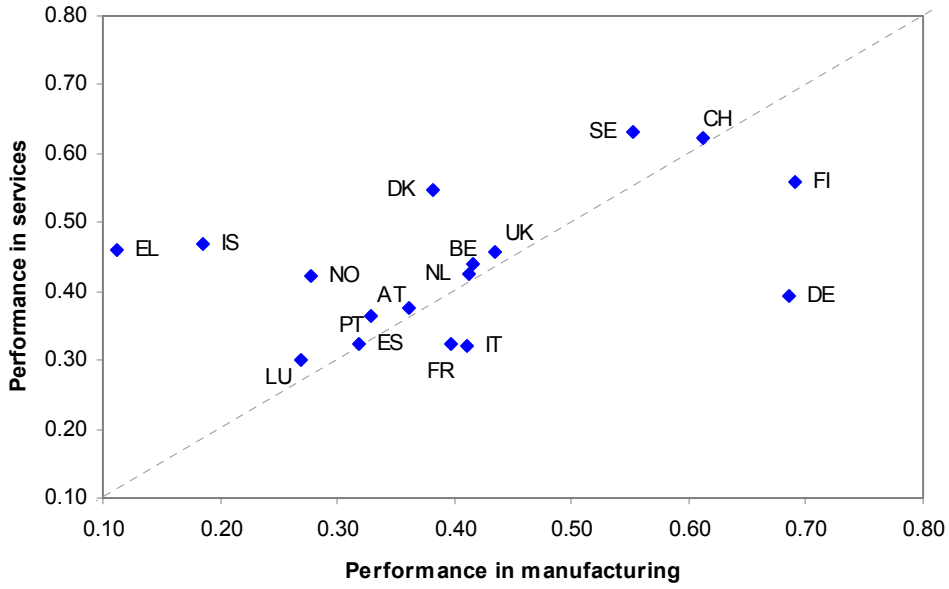
The latest Community Innovation survey made new valuable data available on innovation in the service sector. This opened the way to extending research into comparing innovativeness in the service and the manufacturing sectors.

Figure 6 demonstrates differences between innovativeness in manufacturing and in services for thirteen EU countries, Switzerland, Iceland and Norway[20]. The vertical axis gives a composite index for services and the horizontal axis gives the index for manufacturing. Both use re-scaled data for eight indicators. The manufacturing composite innovation index includes indicators: 1.4, 2.2.1 (manufacturing R&D expenditures) and the manufacturing sub-indicators of 3.1, 3.2, 3.3, 4.3.1, 4.3.2 and 4.7. The services composite innovation index includes indicators: 1.5, 2.2.2 (services R&D expenditures) and the services sub-indicators of 3.1, 3.2, 3.3, 4.3.1, 4.3.2 and 4.7.

Sweden and Denmark are innovation performance leaders in services while Germany, Finland and Switzerland are best performers in manufacturing. Countries above the dotted line perform relatively better in services, those below perform relatively better in manufacturing. Of note, there is a positive correlation between performance in manufacturing and services. This could be due to spillovers in knowledge and expertise between these major sector groups.

Figure 6. Innovation in services and manufacturing

[20] For Ireland and Luxembourg available data is insufficient for analysing differences between manufacturing and services.



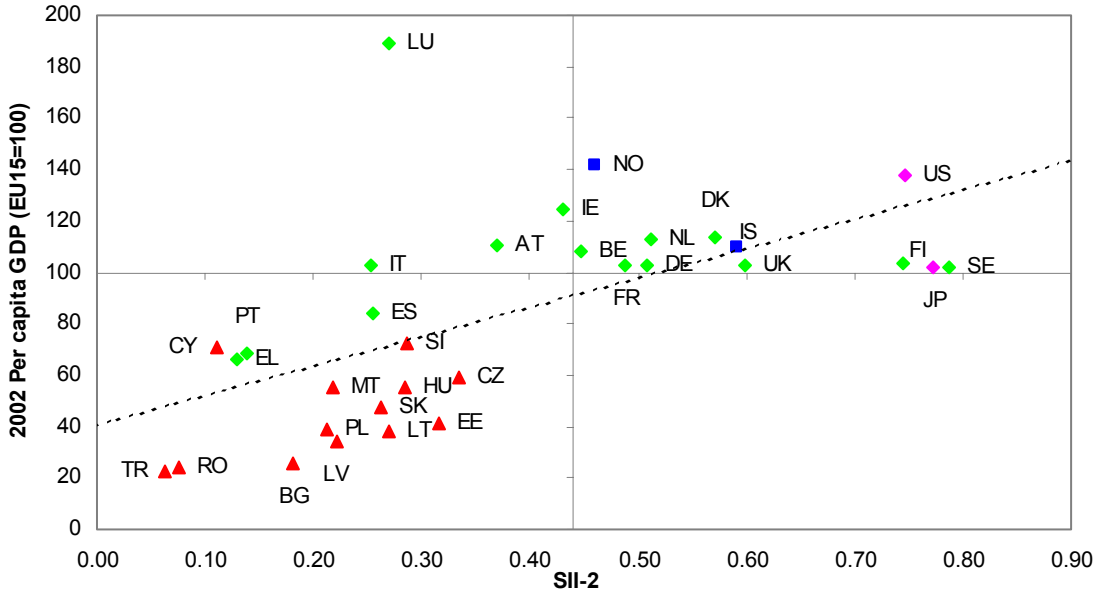
3.2 Innovation vs GDP

Innovation is regarded as one of the key drivers of economic welfare. Figure 8 shows a positive correlation between the SII-2 and per capita GDP in 2002[21]. However, Figure 8 also clearly shows that *innovation is not the only way to achieve high per capita income* levels. Luxembourg shows the advantages of an economic specialization in finance and administrative services and Norway benefits from the existence of vast natural resources. Similarly, a high SII does not always guarantee a high per capita income level as shown by Finland, Sweden and Japan. A similar exercise using levels of labour productivity per employee confirms these conclusions[22].

[21] This positive correlation is quite sensitive to the choice of countries. E.g., a similar graph for the Member States only would not show this correlation. This problem is similar to that discussed in the background paper for the February 2003 Trend Chart workshop "The Future of the Innovation Scoreboard". Porter and Stern ("National Innovative Capacity", 2002) correlated an index of national innovative capacity against per capita GDP in 2000. There is a strong positive correlation (R^2 = 0.83) when about 70 countries, including many developing countries, are entered into the correlation along with the OECD countries. However, there is only a very weak relationship (R^2 = 0.05) between per capita GDP and innovative capacity among high-income OECD countries. If the US is excluded, the relationship is negative (R^2 = -0.12).

[22] Similar exercises using relative growth rates of per capita GDP show no relation at all between the level of the SII and relative economic growth.

Figure 8. Is innovation correlated with per capita GDP?



3.3 R&D-based vs diffusion based innovation

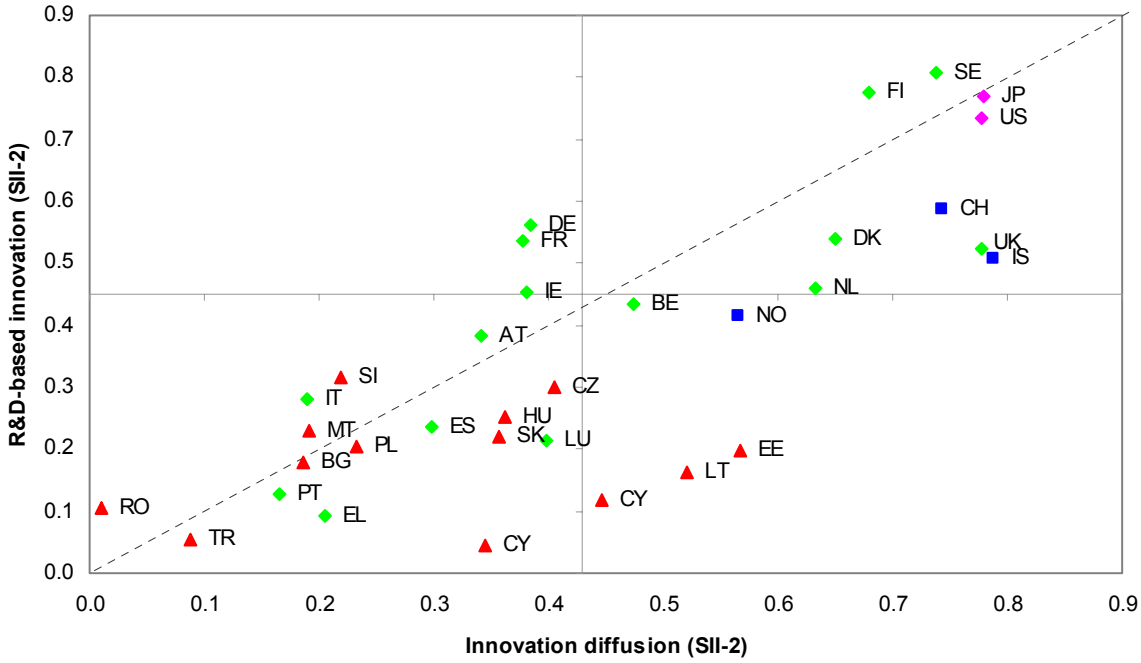
Countries differ in their relative performance in "R&D based" innovation versus "diffusion based" innovation. Larger and economically more developed countries might do better on R&D-based innovation as they can benefit from economies of scale in R&D. Smaller or economically less developed countries might perform better on the diffusion of innovation. Countries performing well in diffusion may have a lower SII due to the fact that the SII gives a greater emphasis to R&D-based innovation[23]. Two separate composite indices were constructed to explore possible differences between countries. The R&D-based innovation index[24] and the diffusion innovation index[25] are shown in Figure 9.

Figure 9 suggests that, with some notable exceptions, countries ranking high on R&D-based innovation will also rank high on their overall SII score. Most of the ACC countries are doing much

[23] The number of indicators related to R&D-creation is about twice the number of indicators related to diffusion.
[24] The *R&D-based innovation index* includes the following indicators (weight in brackets): S&E graduates (1), med/hi-tech manufacturing employment (1), hi-tech services employment (1), public R&D (1), business R&D (1), hi-tech patents (0.5 for EPO and 0.5 for USPTO), all patents (0.5 for EPO and 0.5 for USPTO), SMEs innovating in-house (0.5 for manufacturing and 0.5 for services), SMEs involved in innovation co-operation (0.25 for manufacturing and 0.25 for services), innovation expenditures (0.25 for manufacturing and 0.25 for services), hi-tech venture capital (1), early-stage venture capital (1), sales of new-to-market products (0.5 for manufacturing and 0.5 for services) and the share of hi-tech manufacturing value-added (1).
[25] The *diffusion innovation index* includes the following indicators (weight in brackets): population with tertiary education (1), lifelong learning (1), SMEs involved in innovation co-operation (0.25 for manufacturing and 0.25 for services), innovation expenditures (0.25 for manufacturing and 0.25 for services), sales of new-to-firm products (0.5 for manufacturing and 0.5 for services), internet access/use (1), ICT expenditures (1) and volatility rates (0.5 for manufacturing and 0.5 for services).

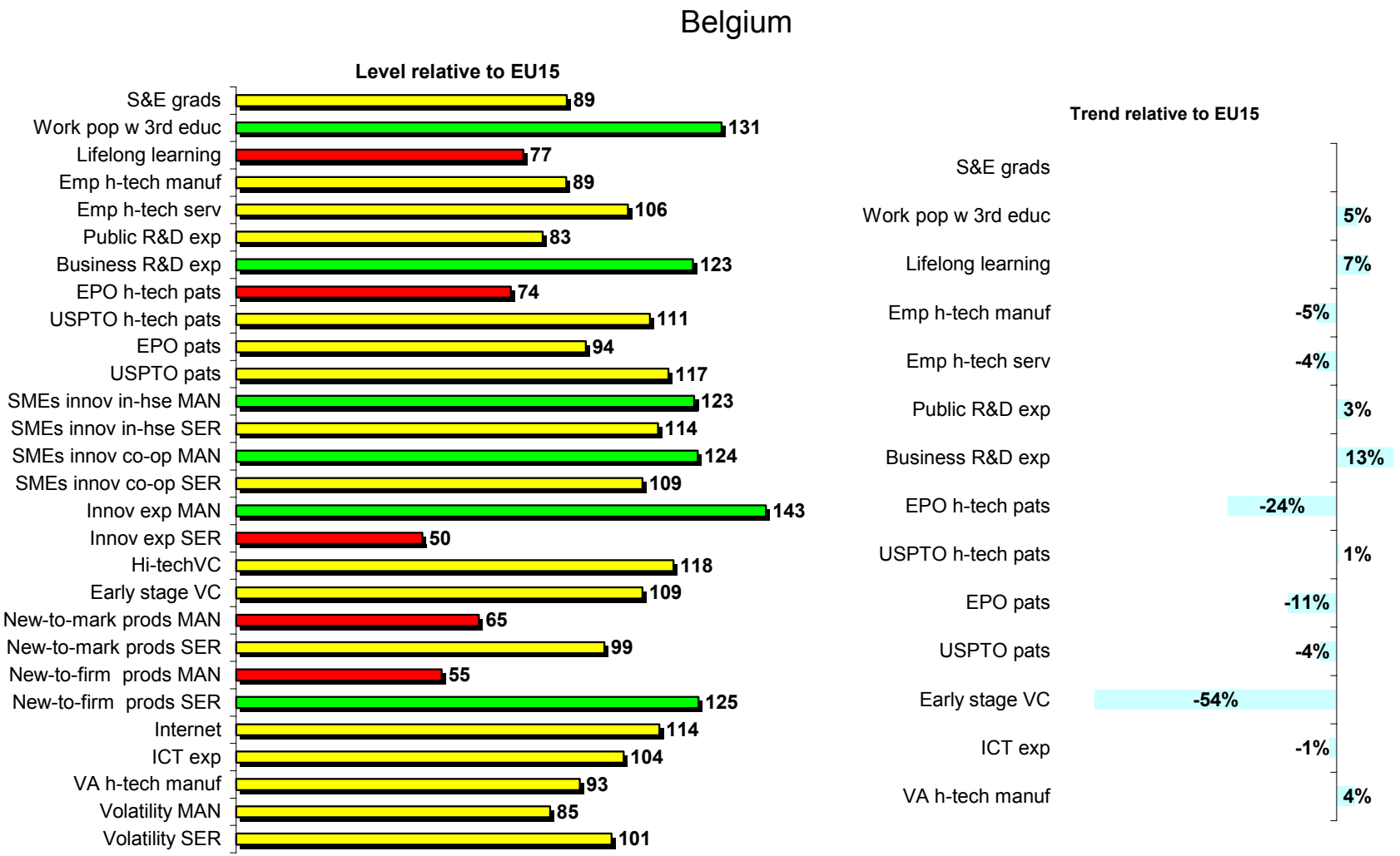
better on the diffusion than on the creation of innovation. Of the ACC leaders, only Slovenia does relatively better on the creation of innovation[26].

Figure 9. R&D-based innovation compared to innovation diffusion

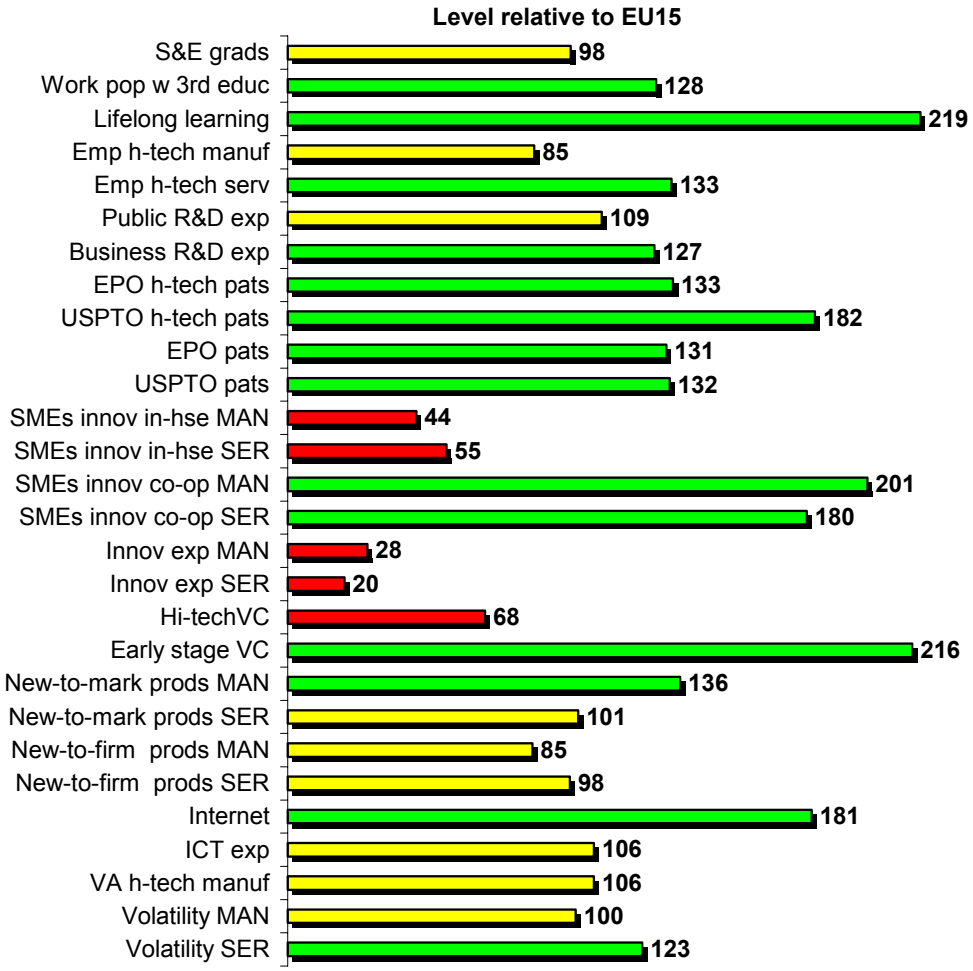


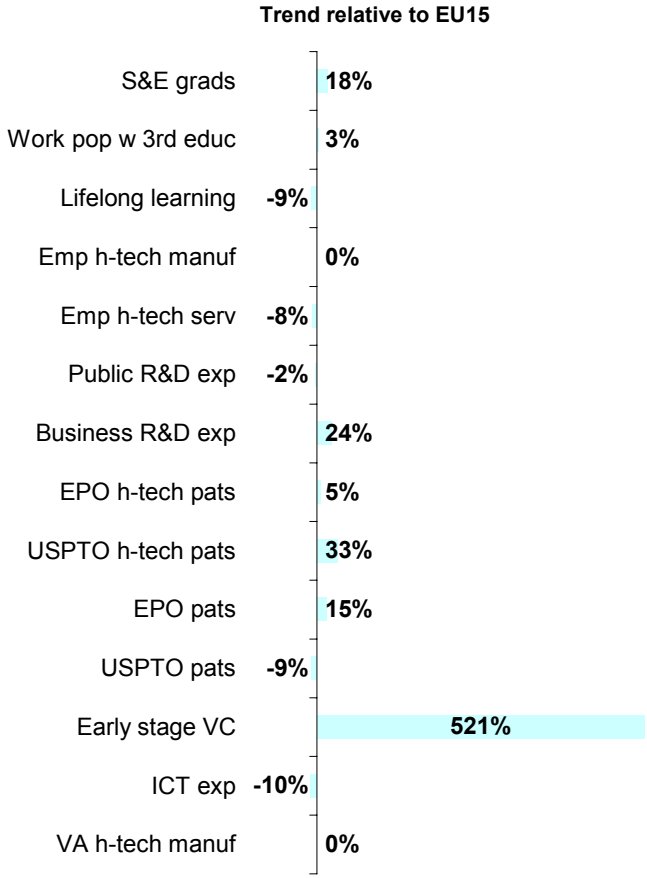
[26] One should keep in mind that the results for the US, Japan, Switzerland and the ACC countries are less reliable than those for the EU Member States as due to limited data availability less indicators could be used for creating the R&D-based composite innovation index and the innovation diffusion composite index. Both indexes are similar to SII-2 as they only cover twelve indicators (cf. footnote 20), with an even stronger focus on 'creation indicators' than in the Member States analysis. Cf. Technical Paper No 6 for more details.

4 Country graphs

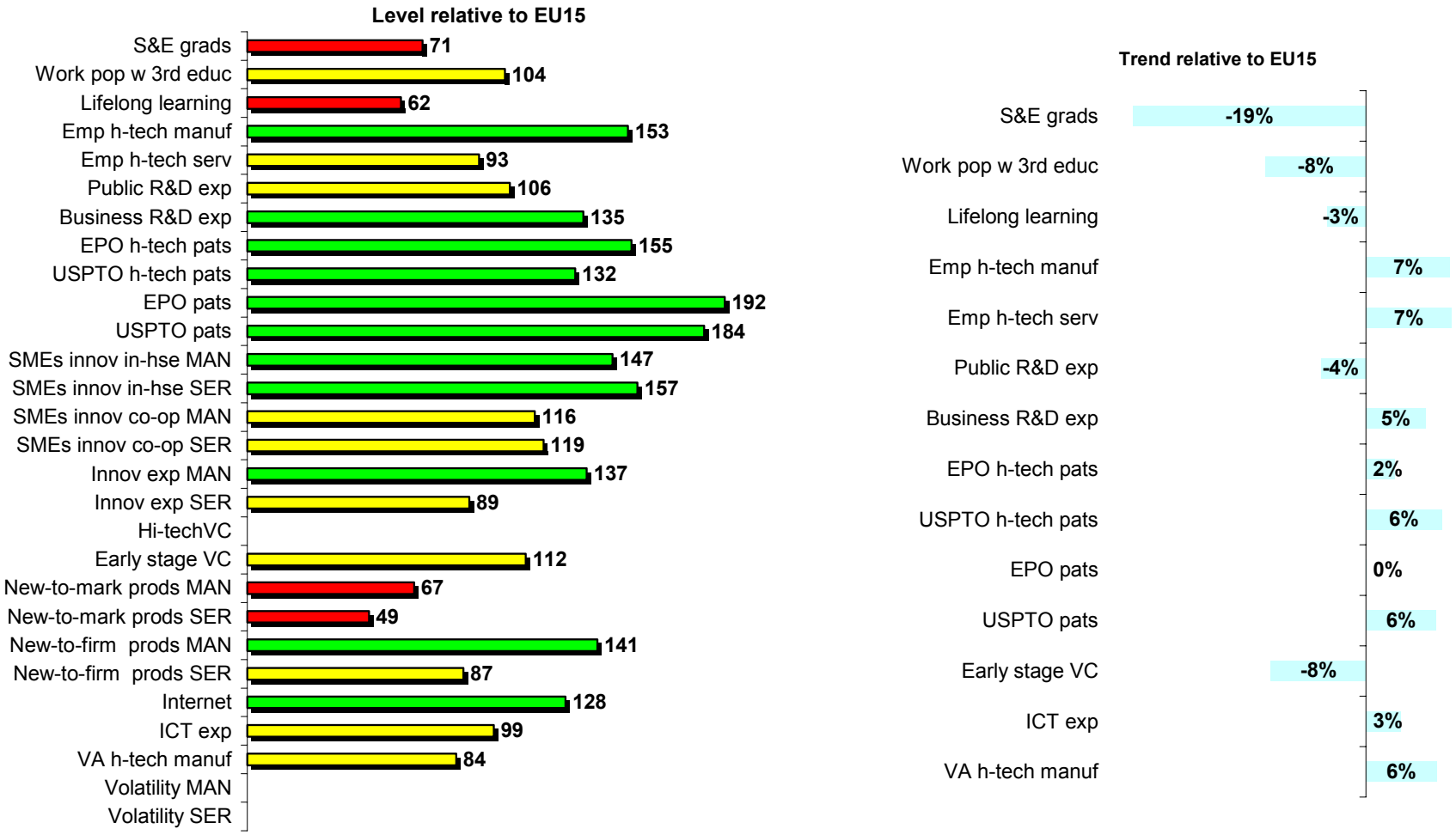


Denmark

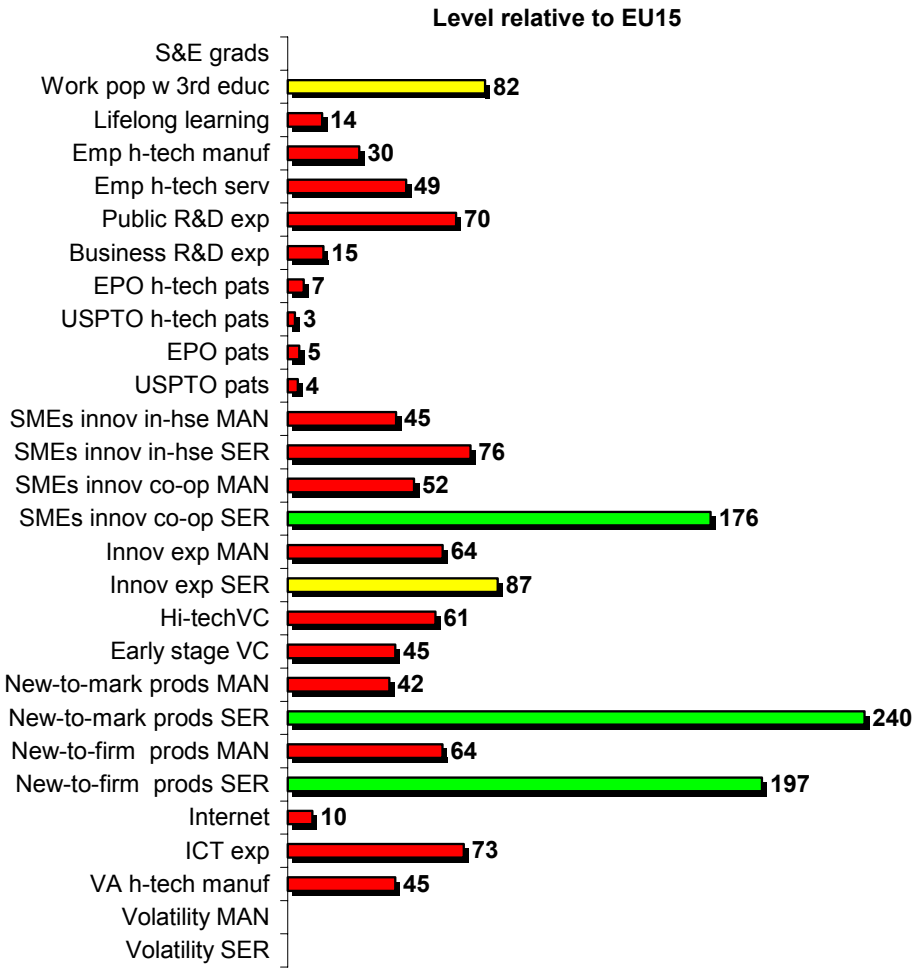

Level relative to EU15
S&E grads 98
Work pop w 3rd educ 128
Lifelong learning 219
Emp h-tech manuf 85
Emp h-tech serv 133
Public R&D exp 109
Business R&D exp 127
EPO h-tech pats 133
USPTO h-tech pats 182
EPO pats 131
USPTO pats 132
SMEs innov in-hse MAN 44
SMEs innov in-hse SER 55
SMEs innov co-op MAN 201
SMEs innov co-op SER 180
Innov exp MAN 28
Innov exp SER 20
Hi-techVC 68
Early stage VC 216
New-to-mark prods MAN 136
New-to-mark prods SER 101
New-to-firm prods MAN 85
New-to-firm prods SER 98
Internet 181
ICT exp 106
VA h-tech manuf 106
Volatility MAN 100
Volatility SER 123

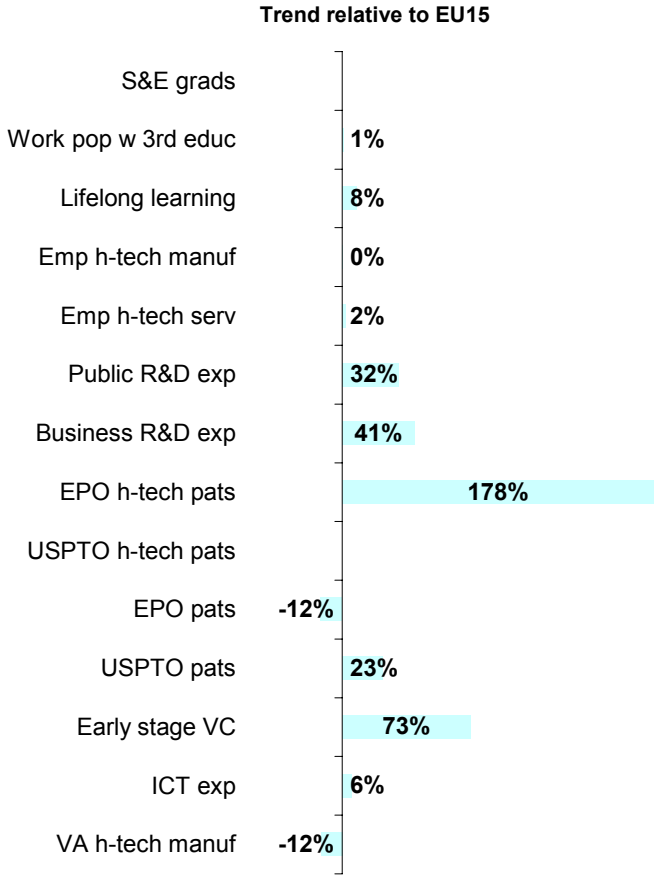

Trend relative to EU15
S&E grads 18%
Work pop w 3rd educ 3%
Lifelong learning -9%
Emp h-tech manuf 0%
Emp h-tech serv -8%
Public R&D exp -2%
Business R&D exp 24%
EPO h-tech pats 5%
USPTO h-tech pats 33%
EPO pats 15%
USPTO pats -9%
Early stage VC 521%
ICT exp -10%
VA h-tech manuf 0%

Germany

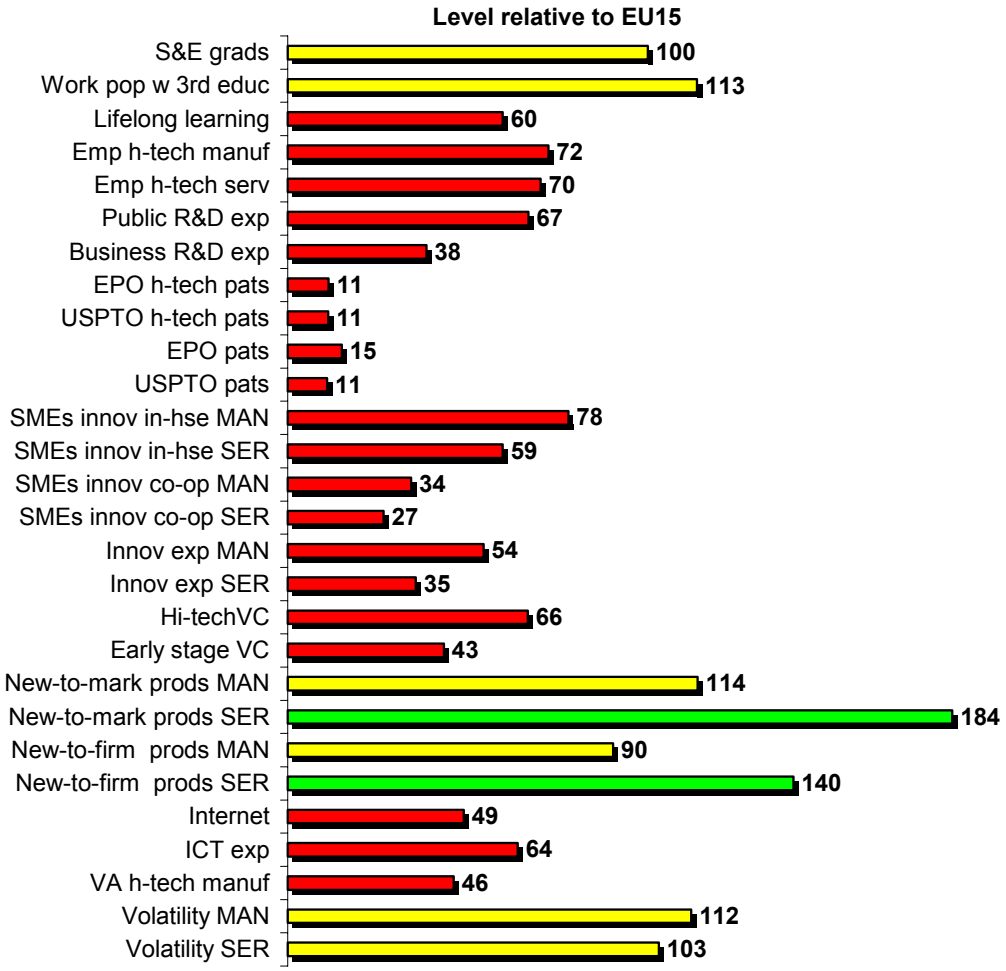

Level relative to EU15
S&E grads 71
Work pop w 3rd educ 104
Lifelong learning 62
Emp h-tech manuf 153
Emp h-tech serv 93
Public R&D exp 106
Business R&D exp 135
EPO h-tech pats 155
USPTO h-tech pats 132
EPO pats 192
USPTO pats 184
SMEs innov in-hse MAN 147
SMEs innov in-hse SER 157
SMEs innov co-op MAN 116
SMEs innov co-op SER 119
Innov exp MAN 137
Innov exp SER 89
Hi-techVC
Early stage VC 112
New-to-mark prods MAN 67
New-to-mark prods SER 49
New-to-firm prods MAN 141
New-to-firm prods SER 87
Internet 128
ICT exp 99
VA h-tech manuf 84
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads -19%
Work pop w 3rd educ -8%
Lifelong learning -3%
Emp h-tech manuf 7%
Emp h-tech serv 7%
Public R&D exp -4%
Business R&D exp 5%
EPO h-tech pats 2%
USPTO h-tech pats 6%
EPO pats 0%
USPTO pats 6%
Early stage VC -8%
ICT exp 3%
VA h-tech manuf 6%

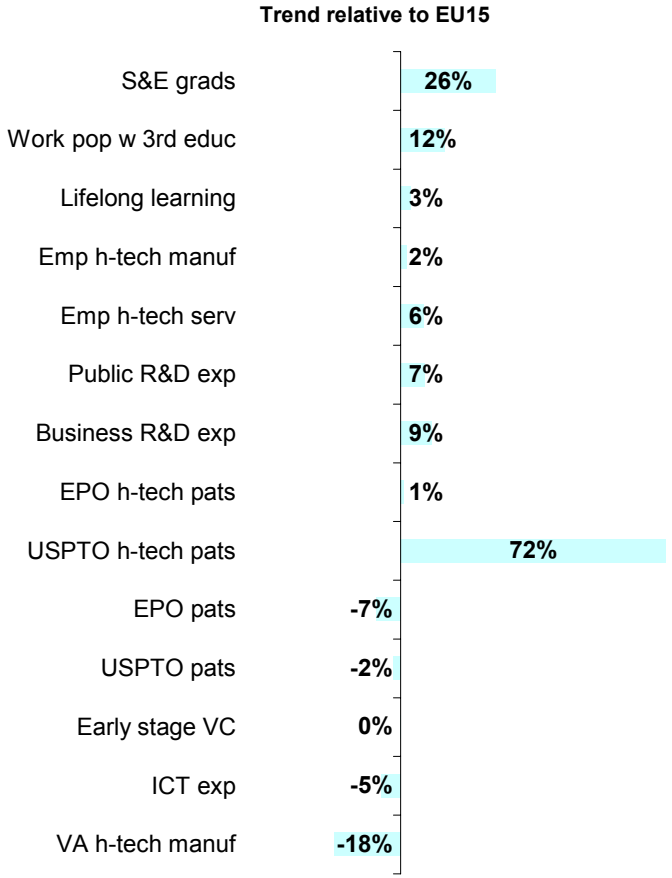
Greece

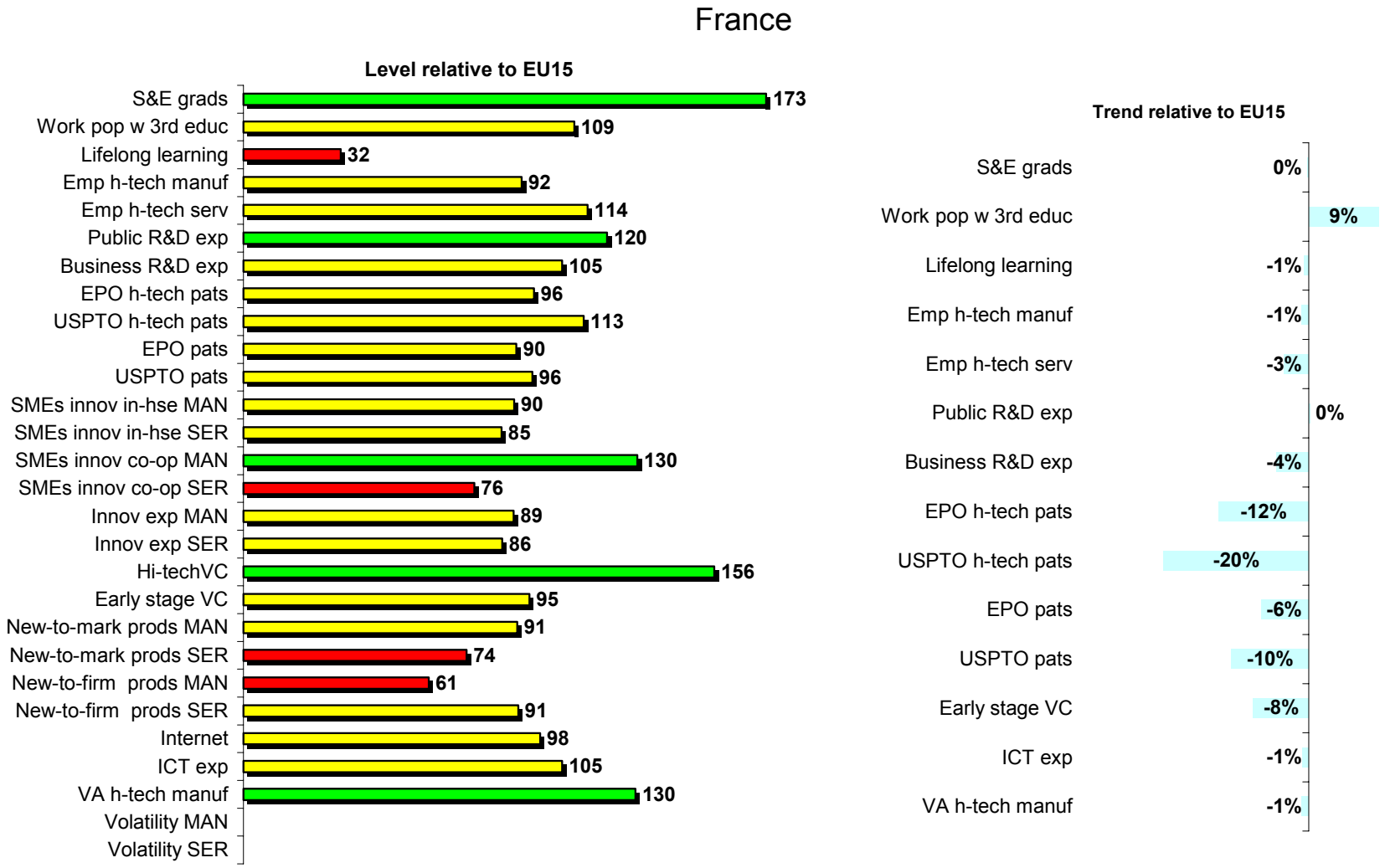

Level relative to EU15
S&E grads
Work pop w 3rd educ 82
Lifelong learning 14
Emp h-tech manuf 30
Emp h-tech serv 49
Public R&D exp 70
Business R&D exp 15
EPO h-tech pats 7
USPTO h-tech pats 3
EPO pats 5
USPTO pats 4
SMEs innov in-hse MAN 45
SMEs innov in-hse SER 76
SMEs innov co-op MAN 52
SMEs innov co-op SER 176
Innov exp MAN 64
Innov exp SER 87
Hi-techVC 61
Early stage VC 45
New-to-mark prods MAN 42
New-to-mark prods SER 240
New-to-firm prods MAN 64
New-to-firm prods SER 197
Internet 10
ICT exp 73
VA h-tech manuf 45
Volatility MAN
Volatility SER


Trend relative to EU15
S&E grads
Work pop w 3rd educ 1%
Lifelong learning 8%
Emp h-tech manuf 0%
Emp h-tech serv 2%
Public R&D exp 32%
Business R&D exp 41%
EPO h-tech pats 178%
USPTO h-tech pats
EPO pats -12%
USPTO pats 23%
Early stage VC 73%
ICT exp 6%
VA h-tech manuf -12%

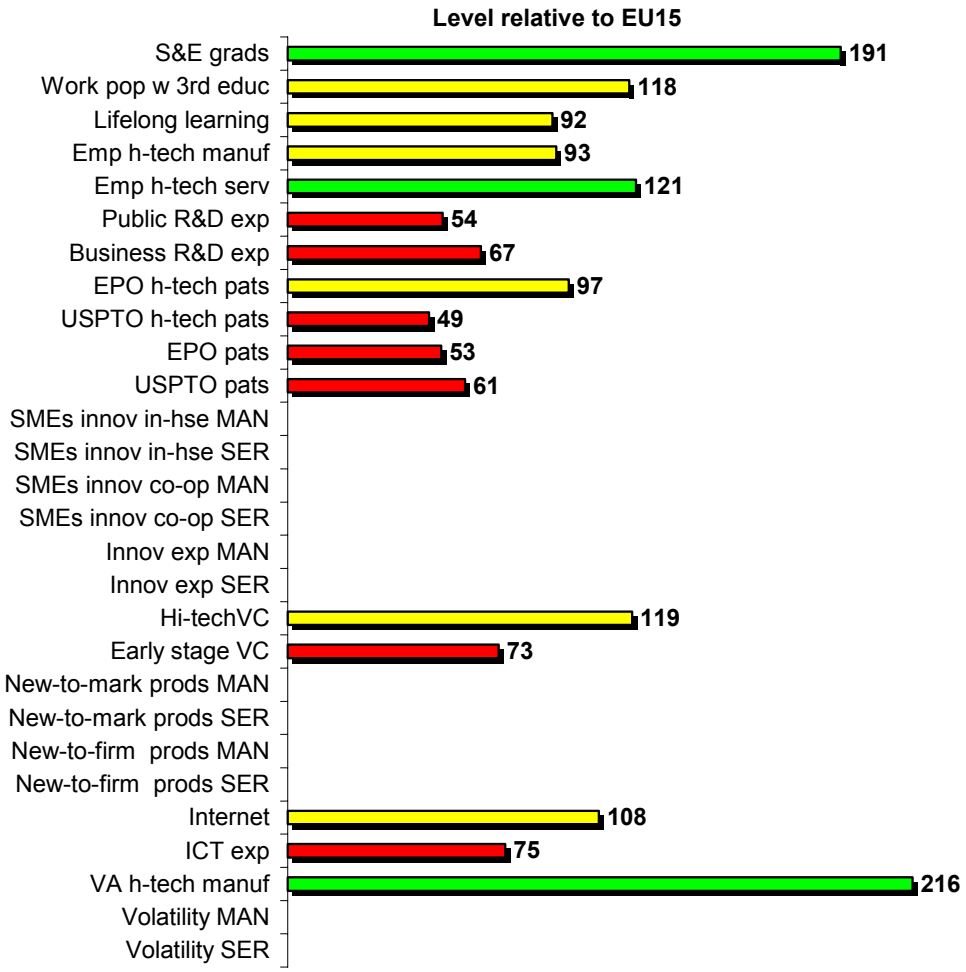
Spain


Level relative to EU15
S&E grads 100
Work pop w 3rd educ 113
Lifelong learning 60
Emp h-tech manuf 72
Emp h-tech serv 70
Public R&D exp 67
Business R&D exp 38
EPO h-tech pats 11
USPTO h-tech pats 11
EPO pats 15
USPTO pats 11
SMEs innov in-hse MAN 78
SMEs innov in-hse SER 59
SMEs innov co-op MAN 34
SMEs innov co-op SER 27
Innov exp MAN 54
Innov exp SER 35
Hi-techVC 66
Early stage VC 43
New-to-mark prods MAN 114
New-to-mark prods SER 184
New-to-firm prods MAN 90
New-to-firm prods SER 140
Internet 49
ICT exp 64
VA h-tech manuf 46
Volatility MAN 112
Volatility SER 103


Trend relative to EU15
S&E grads 26%
Work pop w 3rd educ 12%
Lifelong learning 3%
Emp h-tech manuf 2%
Emp h-tech serv 6%
Public R&D exp 7%
Business R&D exp 9%
EPO h-tech pats 1%
USPTO h-tech pats 72%
EPO pats -7%
USPTO pats -2%
Early stage VC 0%
ICT exp -5%
VA h-tech manuf -18%


France
Level relative to EU15
S&E grads 173
Work pop w 3rd educ 109
Lifelong learning 32
Emp h-tech manuf 92
Emp h-tech serv 114
Public R&D exp 120
Business R&D exp 105
EPO h-tech pats 96
USPTO h-tech pats 113
EPO pats 90
USPTO pats 96
SMEs innov in-hse MAN 90
SMEs innov in-hse SER 85
SMEs innov co-op MAN 130
SMEs innov co-op SER 76
Innov exp MAN 89
Innov exp SER 86
Hi-techVC 156
Early stage VC 95
New-to-mark prods MAN 91
New-to-mark prods SER 74
New-to-firm prods MAN 61
New-to-firm prods SER 91
Internet 98
ICT exp 105
VA h-tech manuf 130
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads 0%
Work pop w 3rd educ 9%
Lifelong learning -1%
Emp h-tech manuf -1%
Emp h-tech serv -3%
Public R&D exp 0%
Business R&D exp -4%
EPO h-tech pats -12%
USPTO h-tech pats -20%
EPO pats -6%
USPTO pats -10%
Early stage VC -8%
ICT exp -1%
VA h-tech manuf -1%

Ireland


Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
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121
54
67
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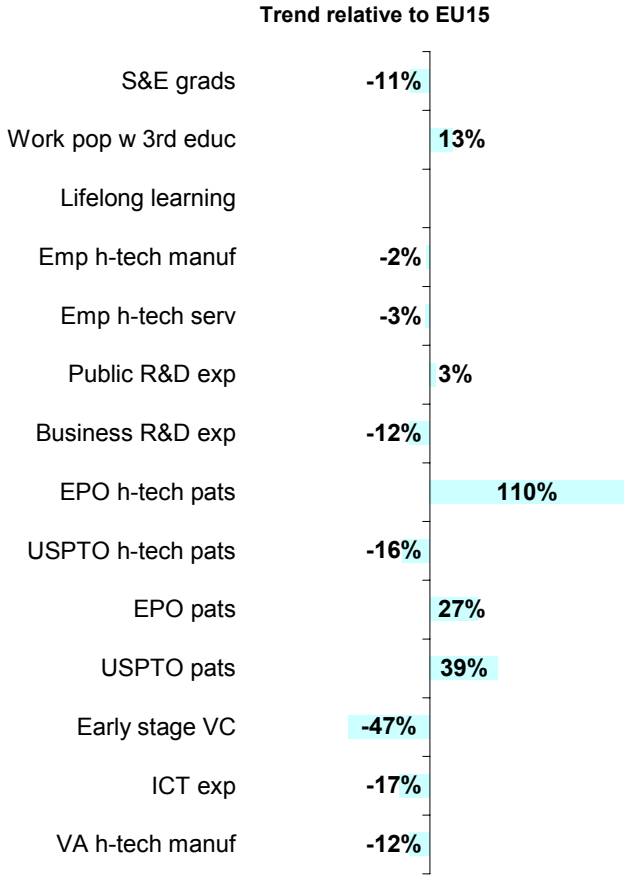
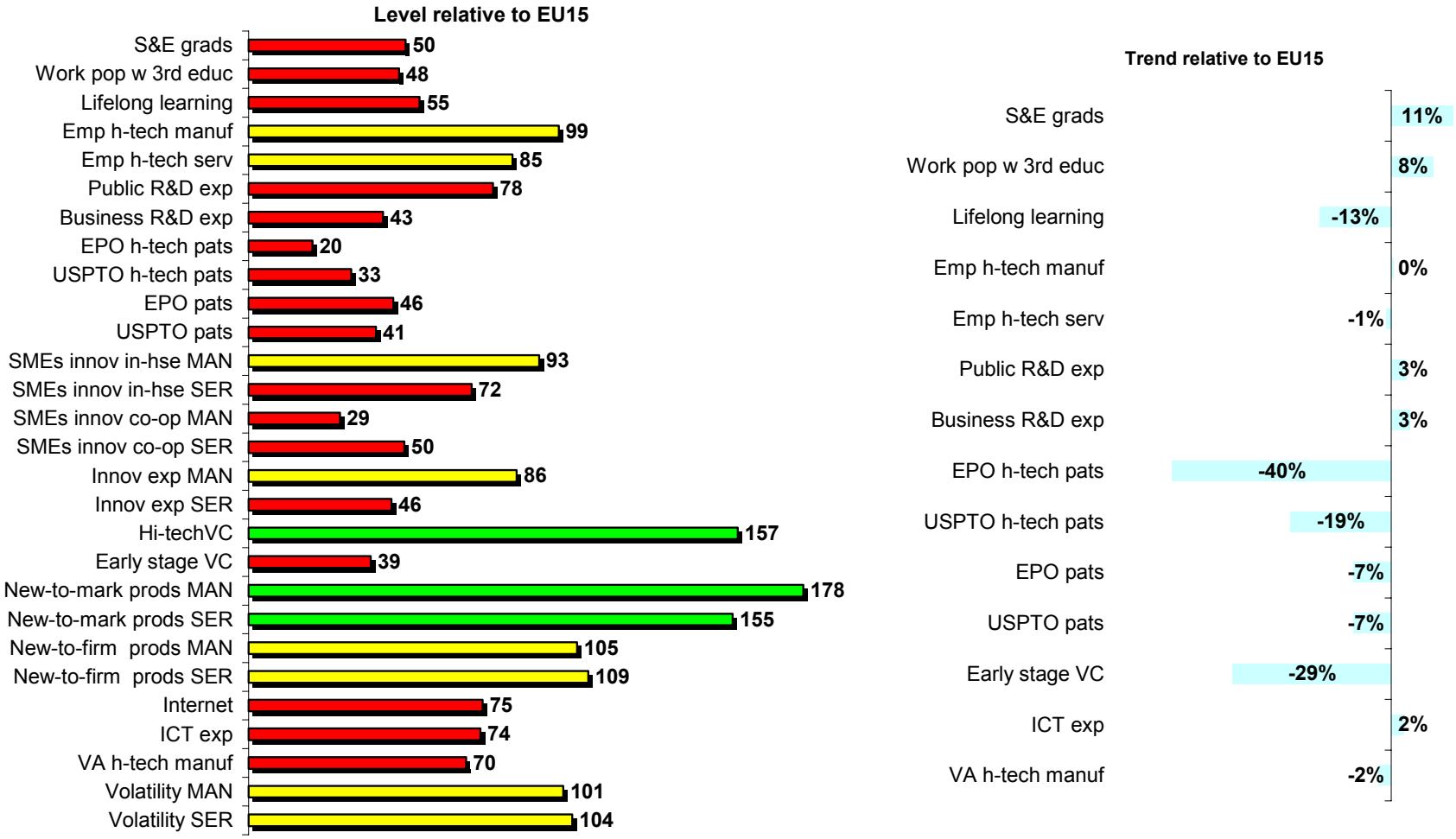
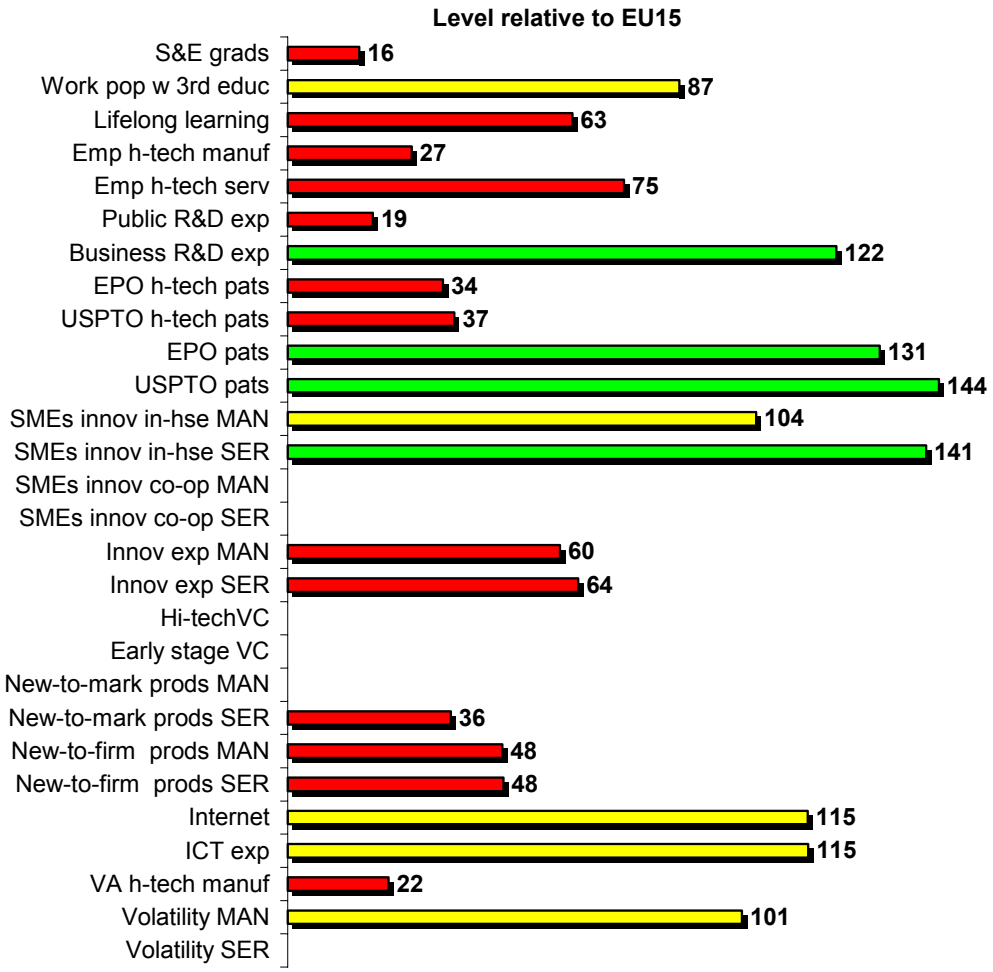
61
119
73
108
75
216

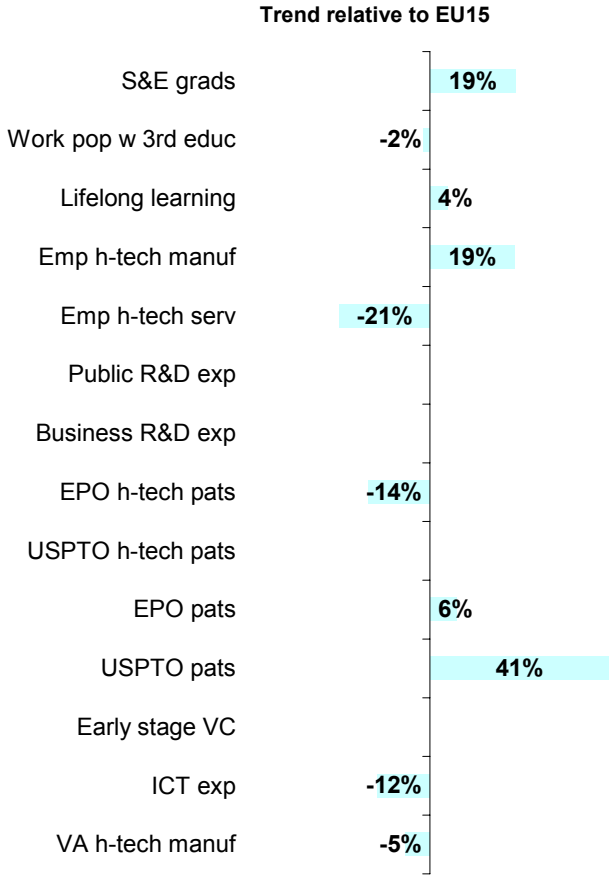

Trend relative to EU15
S&E grads
-11%
Work pop w 3rd educ
13%
Lifelong learning
Emp h-tech manuf
-2%
Emp h-tech serv
-3%
Public R&D exp
3%
Business R&D exp
-12%
EPO h-tech pats
110%
USPTO h-tech pats
-16%
EPO pats
27%
USPTO pats
39%
Early stage VC
-47%
ICT exp
-17%
VA h-tech manuf
-12%

Italy

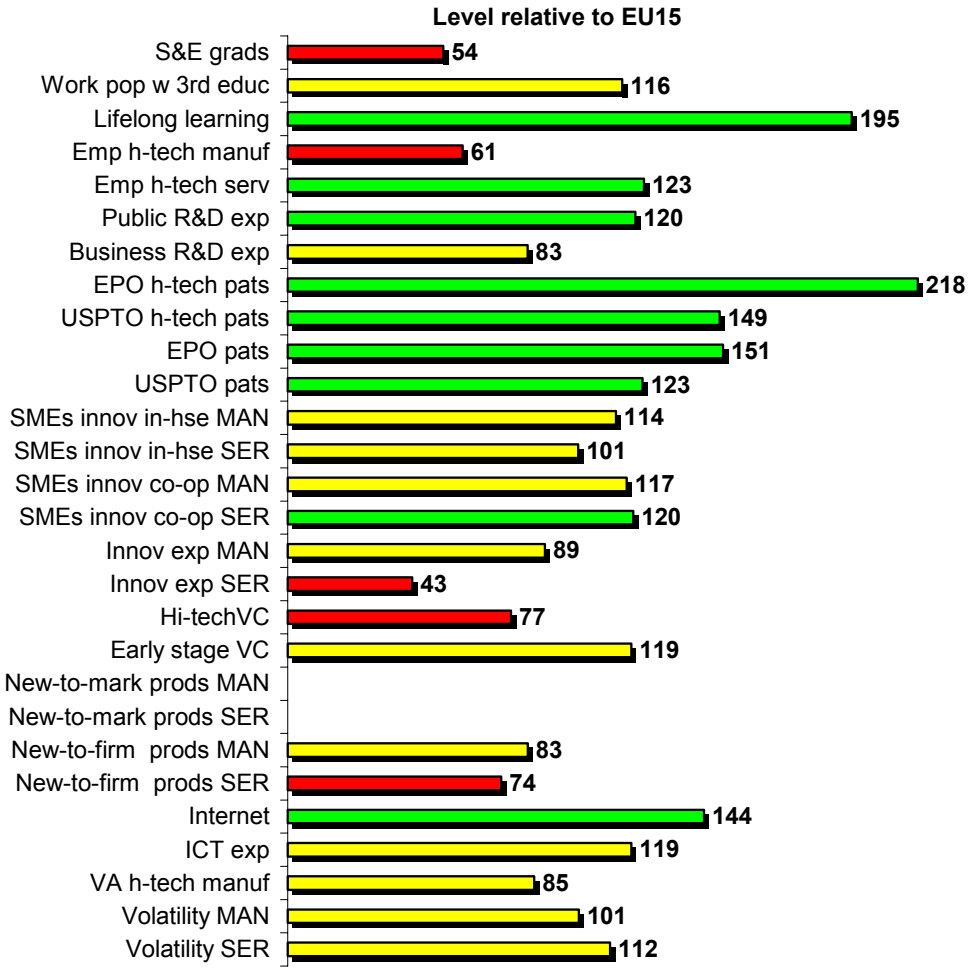

Level relative to EU15
S&E grads 50
Work pop w 3rd educ 48
Lifelong learning 55
Emp h-tech manuf 99
Emp h-tech serv 85
Public R&D exp 78
Business R&D exp 43
EPO h-tech pats 20
USPTO h-tech pats 33
EPO pats 46
USPTO pats 41
SMEs innov in-hse MAN 93
SMEs innov in-hse SER 72
SMEs innov co-op MAN 29
SMEs innov co-op SER 50
Innov exp MAN 86
Innov exp SER 46
Hi-techVC 157
Early stage VC 39
New-to-mark prods MAN 178
New-to-mark prods SER 155
New-to-firm prods MAN 105
New-to-firm prods SER 109
Internet 75
ICT exp 74
VA h-tech manuf 70
Volatility MAN 101
Volatility SER 104
Trend relative to EU15
S&E grads 11%
Work pop w 3rd educ 8%
Lifelong learning -13%
Emp h-tech manuf 0%
Emp h-tech serv -1%
Public R&D exp 3%
Business R&D exp 3%
EPO h-tech pats -40%
USPTO h-tech pats -19%
EPO pats -7%
USPTO pats -7%
Early stage VC -29%
ICT exp 2%
VA h-tech manuf -2%

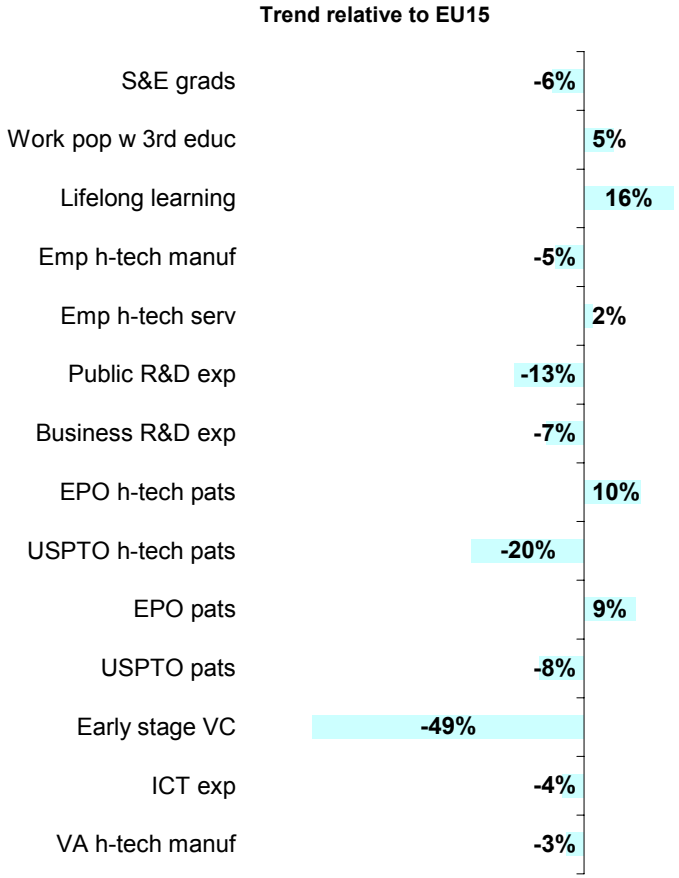
Luxembourg


Level relative to EU15
S&E grads 16
Work pop w 3rd educ 87
Lifelong learning 63
Emp h-tech manuf 27
Emp h-tech serv 75
Public R&D exp 19
Business R&D exp 122
EPO h-tech pats 34
USPTO h-tech pats 37
EPO pats 131
USPTO pats 144
SMEs innov in-hse MAN 104
SMEs innov in-hse SER 141
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN 60
Innov exp SER 64
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER 36
New-to-firm prods MAN 48
New-to-firm prods SER 48
Internet 115
ICT exp 115
VA h-tech manuf 22
Volatility MAN 101
Volatility SER

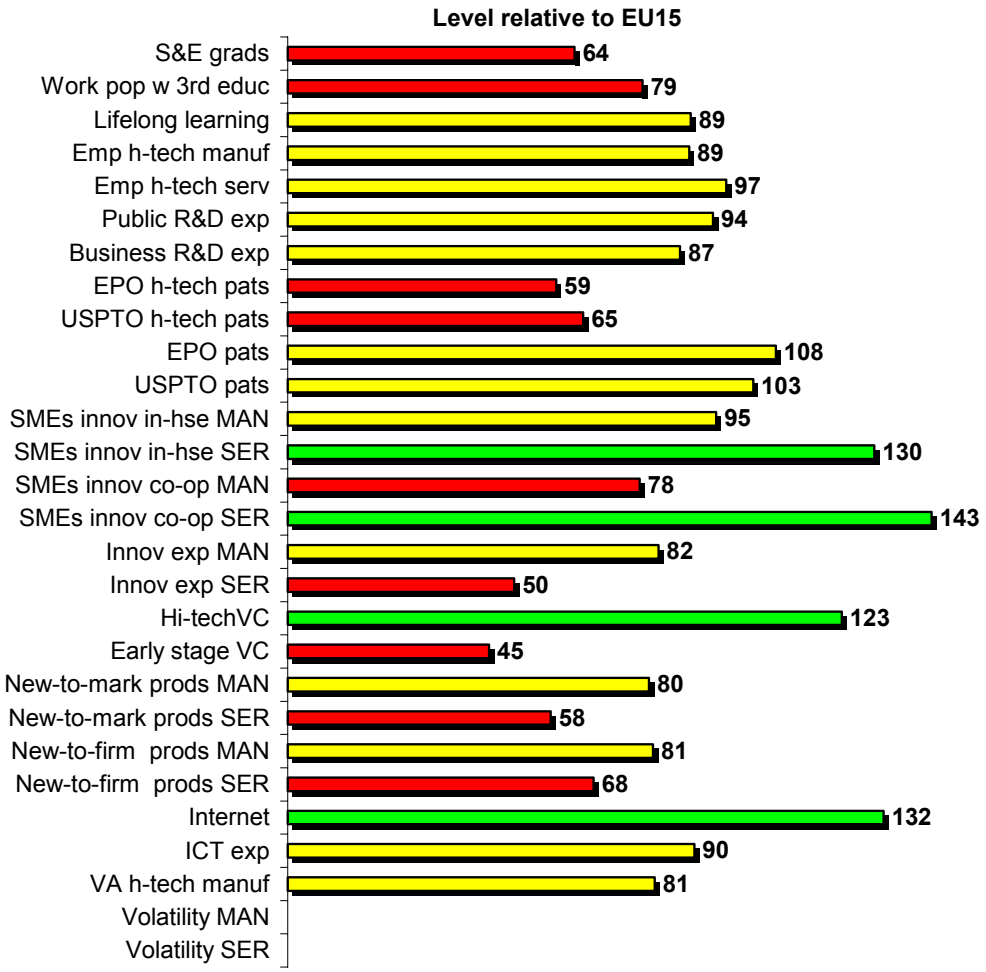

Trend relative to EU15
S&E grads 19%
Work pop w 3rd educ -2%
Lifelong learning 4%
Emp h-tech manuf 19%
Emp h-tech serv -21%
Public R&D exp
Business R&D exp
EPO h-tech pats -14%
USPTO h-tech pats
EPO pats 6%
USPTO pats 41%
Early stage VC
ICT exp -12%
VA h-tech manuf -5%

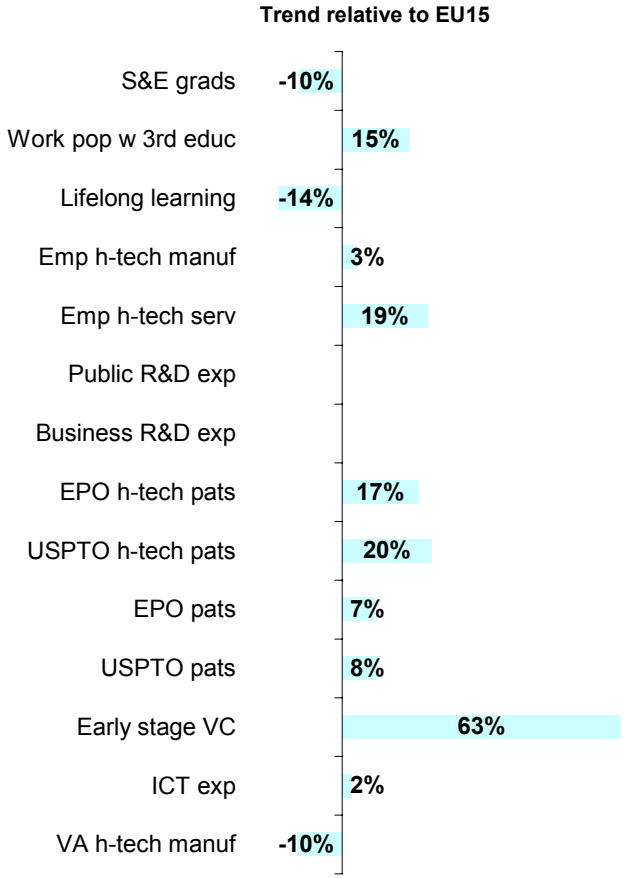
Netherlands



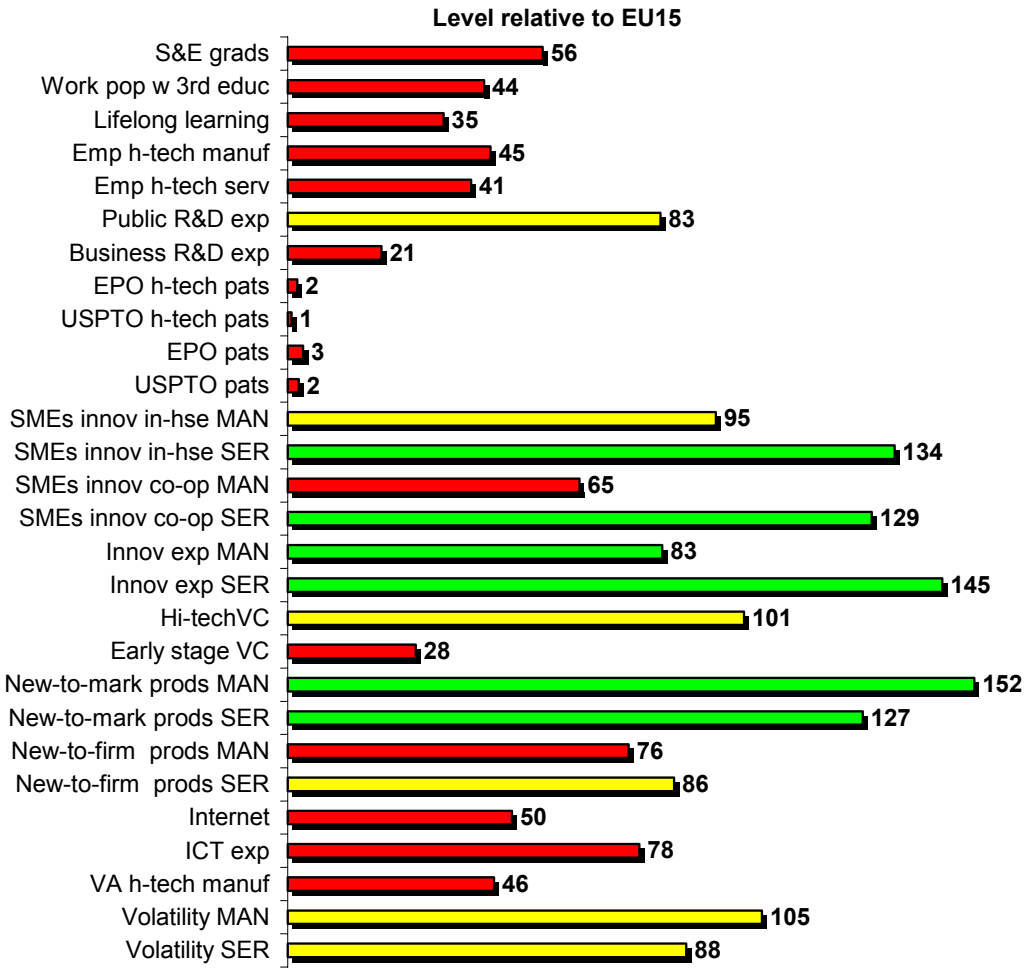


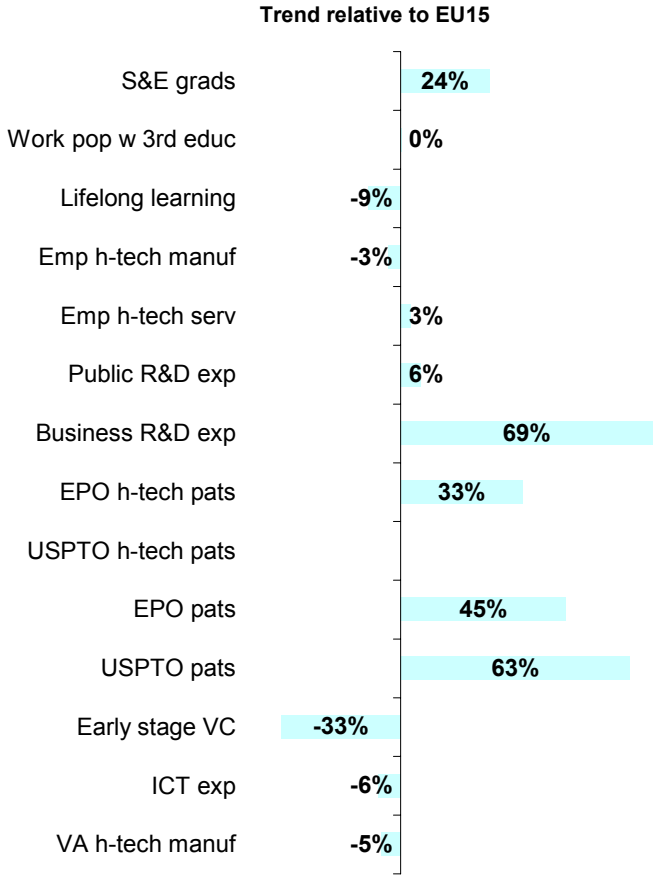
Austria


Level relative to EU15
S&E grads 64
Work pop w 3rd educ 79
Lifelong learning 89
Emp h-tech manuf 89
Emp h-tech serv 97
Public R&D exp 94
Business R&D exp 87
EPO h-tech pats 59
USPTO h-tech pats 65
EPO pats 108
USPTO pats 103
SMEs innov in-hse MAN 95
SMEs innov in-hse SER 130
SMEs innov co-op MAN 78
SMEs innov co-op SER 143
Innov exp MAN 82
Innov exp SER 50
Hi-techVC 123
Early stage VC 45
New-to-mark prods MAN 80
New-to-mark prods SER 58
New-to-firm prods MAN 81
New-to-firm prods SER 68
Internet 132
ICT exp 90
VA h-tech manuf 81
Volatility MAN
Volatility SER

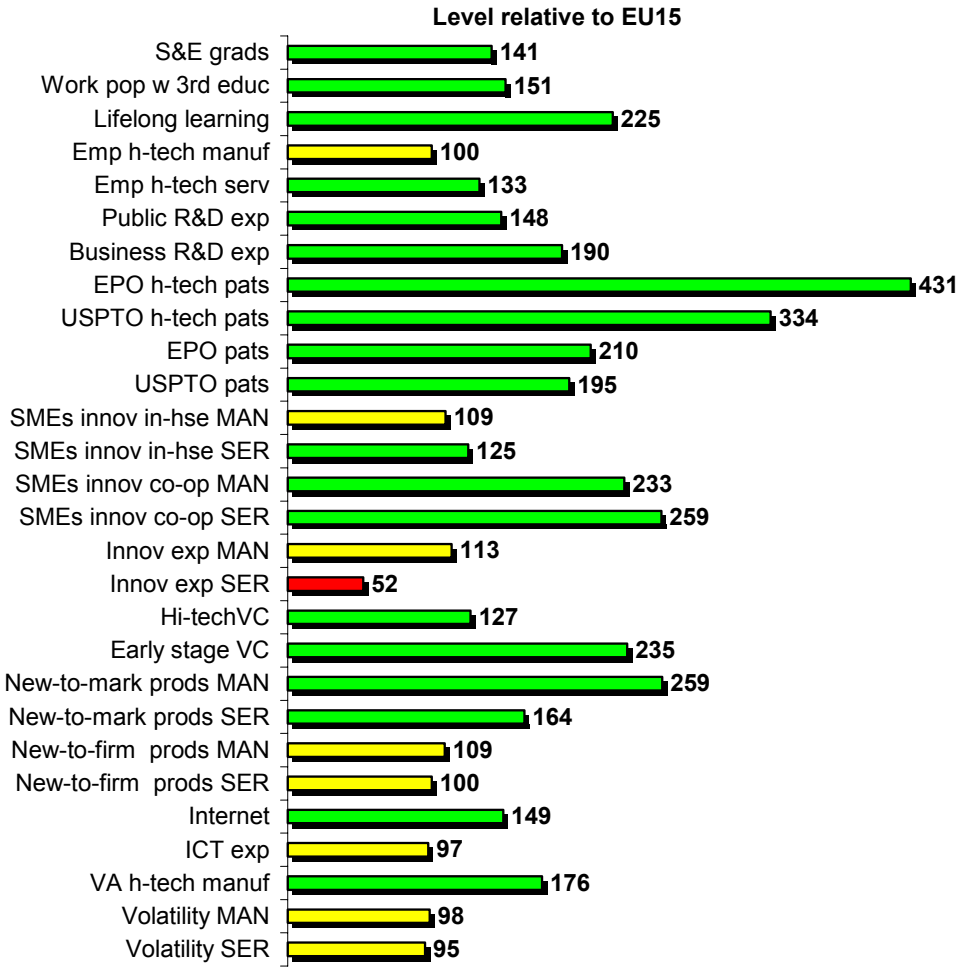

Trend relative to EU15
S&E grads -10%
Work pop w 3rd educ 15%
Lifelong learning -14%
Emp h-tech manuf 3%
Emp h-tech serv 19%
Public R&D exp
Business R&D exp
EPO h-tech pats 17%
USPTO h-tech pats 20%
EPO pats 7%
USPTO pats 8%
Early stage VC 63%
ICT exp 2%
VA h-tech manuf -10%

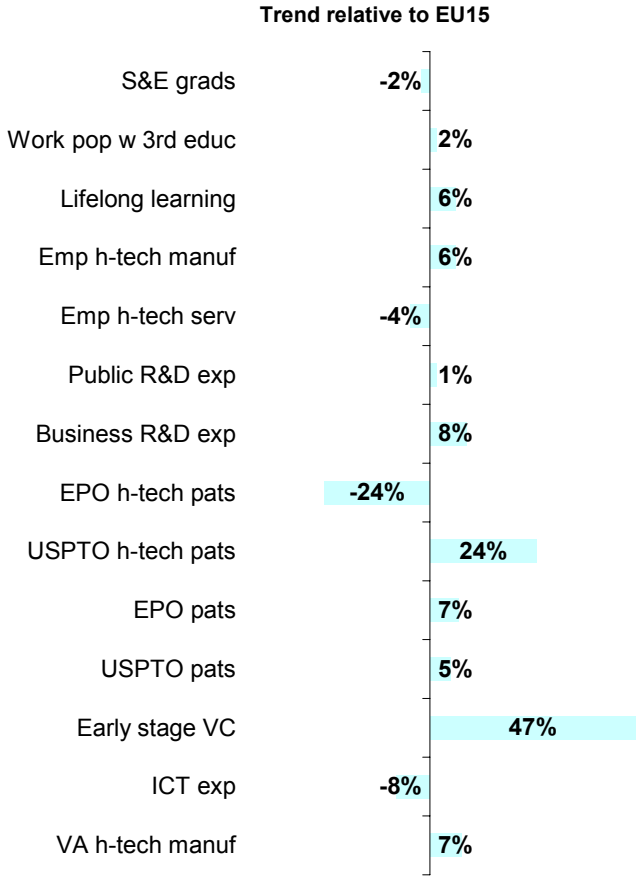
Portugal

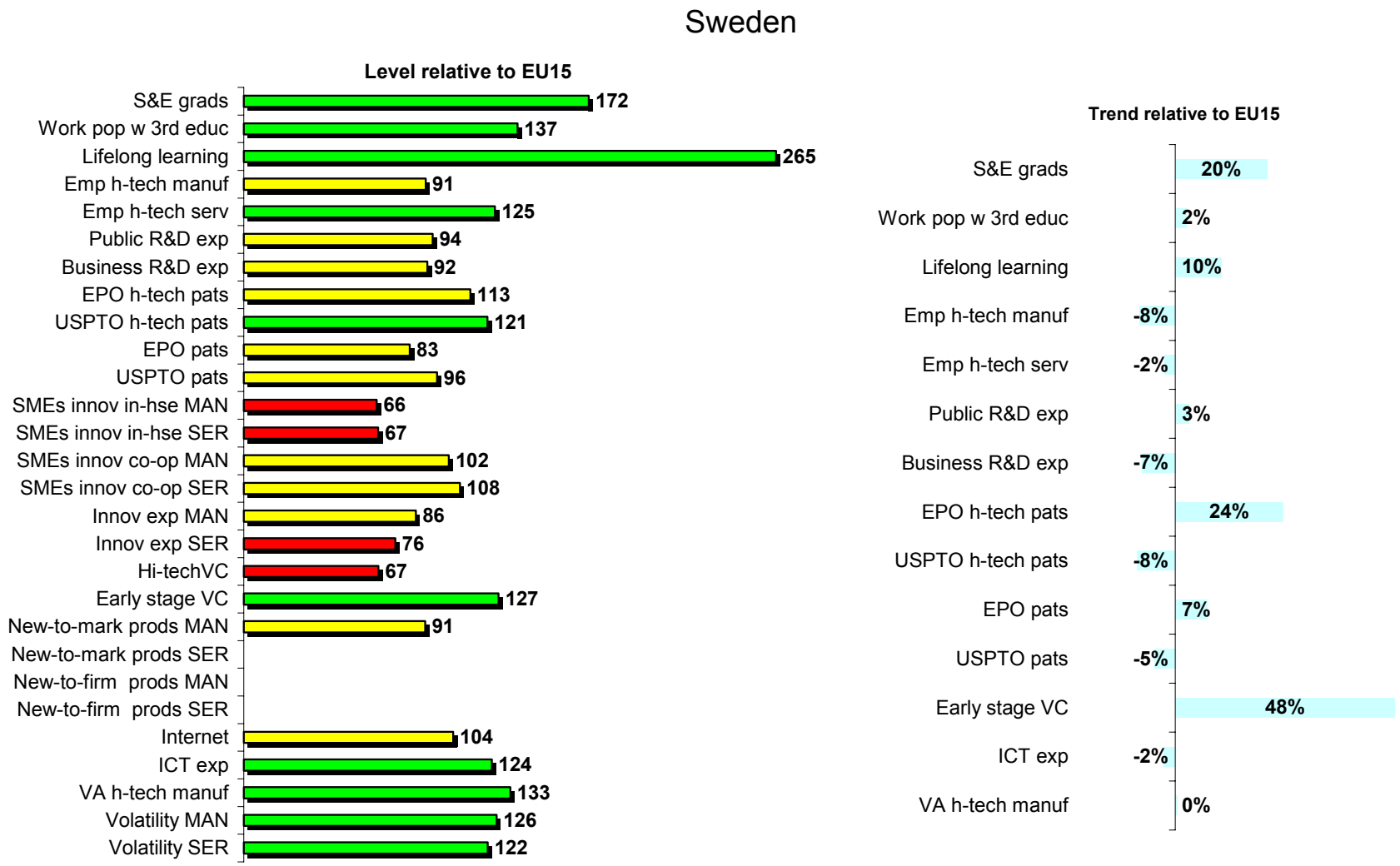

Level relative to EU15
S&E grads 56
Work pop w 3rd educ 44
Lifelong learning 35
Emp h-tech manuf 45
Emp h-tech serv 41
Public R&D exp 83
Business R&D exp 21
EPO h-tech pats 2
USPTO h-tech pats 1
EPO pats 3
USPTO pats 2
SMEs innov in-hse MAN 95
SMEs innov in-hse SER 134
SMEs innov co-op MAN 65
SMEs innov co-op SER 129
Innov exp MAN 83
Innov exp SER 145
Hi-techVC 101
Early stage VC 28
New-to-mark prods MAN 152
New-to-mark prods SER 127
New-to-firm prods MAN 76
New-to-firm prods SER 86
Internet 50
ICT exp 78
VA h-tech manuf 46
Volatility MAN 105
Volatility SER 88


Trend relative to EU15
S&E grads 24%
Work pop w 3rd educ 0%
Lifelong learning -9%
Emp h-tech manuf -3%
Emp h-tech serv 3%
Public R&D exp 6%
Business R&D exp 69%
EPO h-tech pats 33%
USPTO h-tech pats
EPO pats 45%
USPTO pats 63%
Early stage VC -33%
ICT exp -6%
VA h-tech manuf -5%

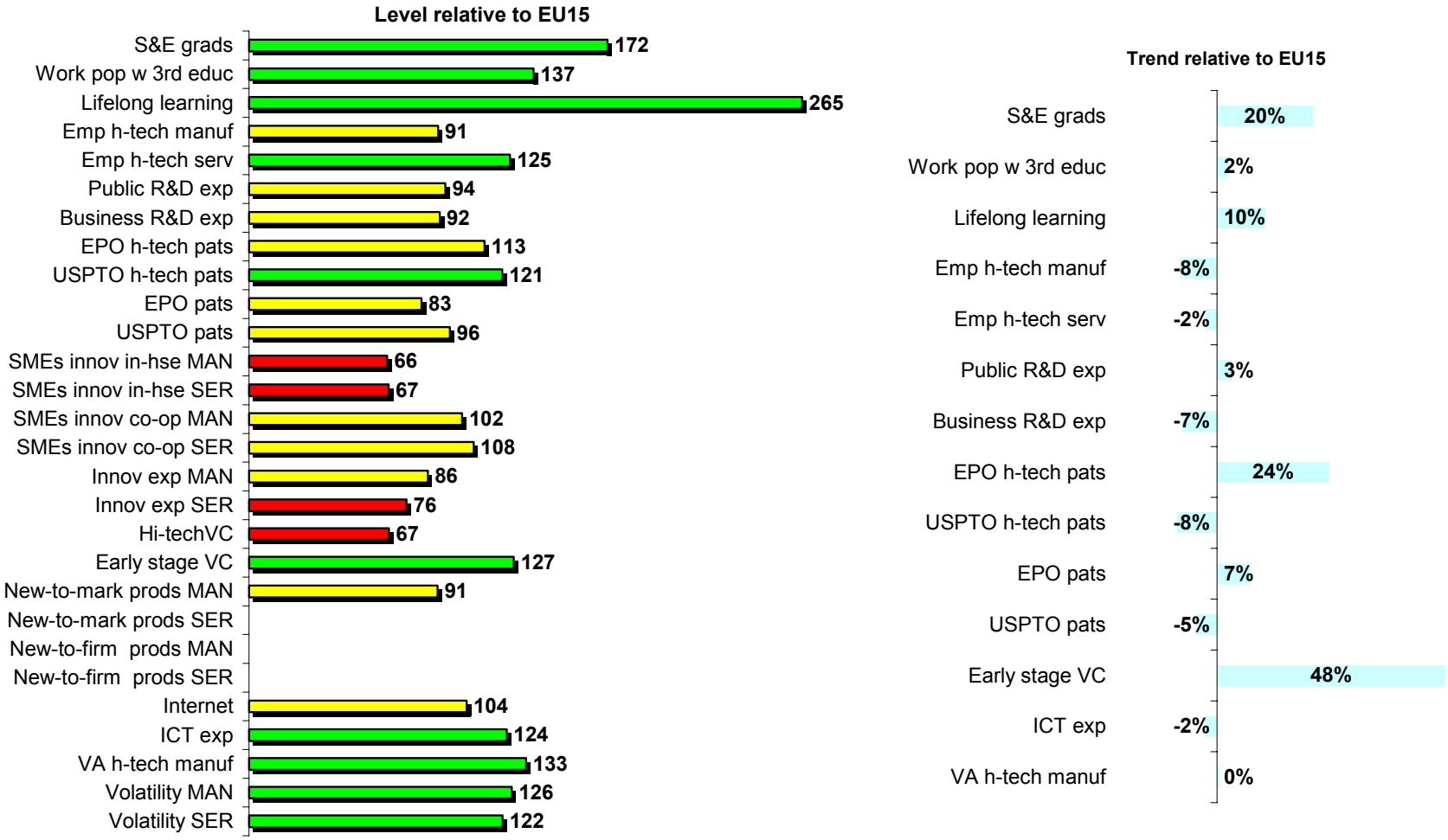
Finland


Level relative to EU15
S&E grads 141
Work pop w 3rd educ 151
Lifelong learning 225
Emp h-tech manuf 100
Emp h-tech serv 133
Public R&D exp 148
Business R&D exp 190
EPO h-tech pats 431
USPTO h-tech pats 334
EPO pats 210
USPTO pats 195
SMEs innov in-hse MAN 109
SMEs innov in-hse SER 125
SMEs innov co-op MAN 233
SMEs innov co-op SER 259
Innov exp MAN 113
Innov exp SER 52
Hi-techVC 127
Early stage VC 235
New-to-mark prods MAN 259
New-to-mark prods SER 164
New-to-firm prods MAN 109
New-to-firm prods SER 100
Internet 149
ICT exp 97
VA h-tech manuf 176
Volatility MAN 98
Volatility SER 95

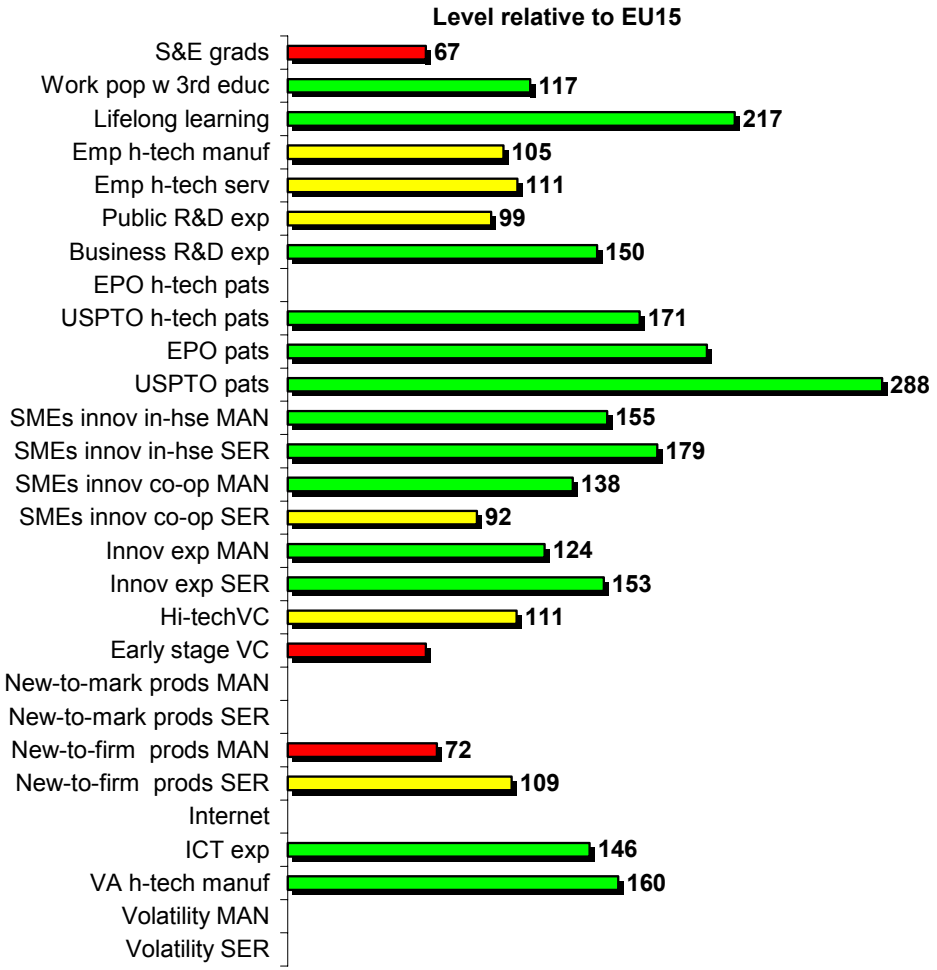

Trend relative to EU15
S&E grads -2%
Work pop w 3rd educ 2%
Lifelong learning 6%
Emp h-tech manuf 6%
Emp h-tech serv -4%
Public R&D exp 1%
Business R&D exp 8%
EPO h-tech pats -24%
USPTO h-tech pats 24%
EPO pats 7%
USPTO pats 5%
Early stage VC 47%
ICT exp -8%
VA h-tech manuf 7%

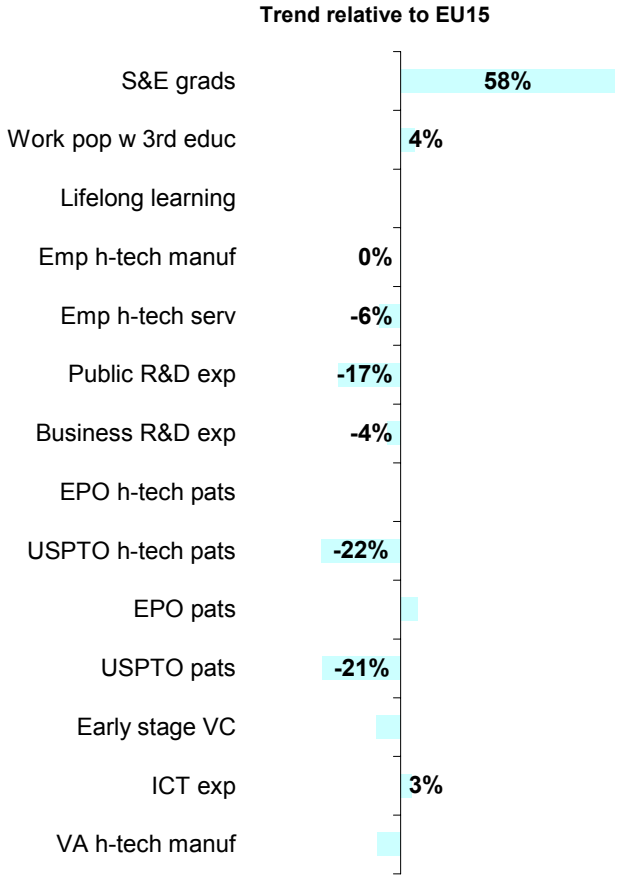

Sweden
Level relative to EU15
S&E grads 172
Work pop w 3rd educ 137
Lifelong learning 265
Emp h-tech manuf 91
Emp h-tech serv 125
Public R&D exp 94
Business R&D exp 92
EPO h-tech pats 113
USPTO h-tech pats 121
EPO pats 83
USPTO pats 96
SMEs innov in-hse MAN 66
SMEs innov in-hse SER 67
SMEs innov co-op MAN 102
SMEs innov co-op SER 108
Innov exp MAN 86
Innov exp SER 76
Hi-techVC 67
Early stage VC 127
New-to-mark prods MAN 91
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 104
ICT exp 124
VA h-tech manuf 133
Volatility MAN 126
Volatility SER 122
Trend relative to EU15
S&E grads 20%
Work pop w 3rd educ 2%
Lifelong learning 10%
Emp h-tech manuf -8%
Emp h-tech serv -2%
Public R&D exp 3%
Business R&D exp -7%
EPO h-tech pats 24%
USPTO h-tech pats -8%
EPO pats 7%
USPTO pats -5%
Early stage VC 48%
ICT exp -2%
VA h-tech manuf 0%

United Kingdom

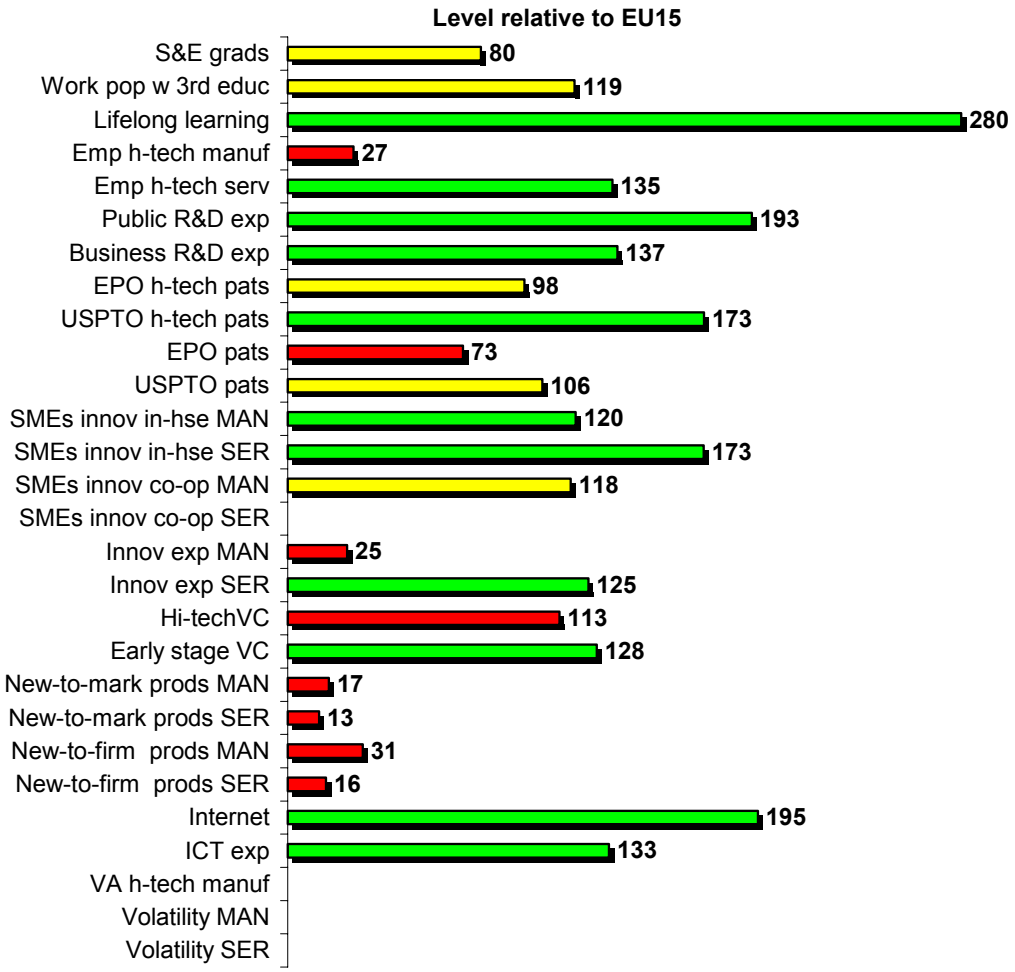


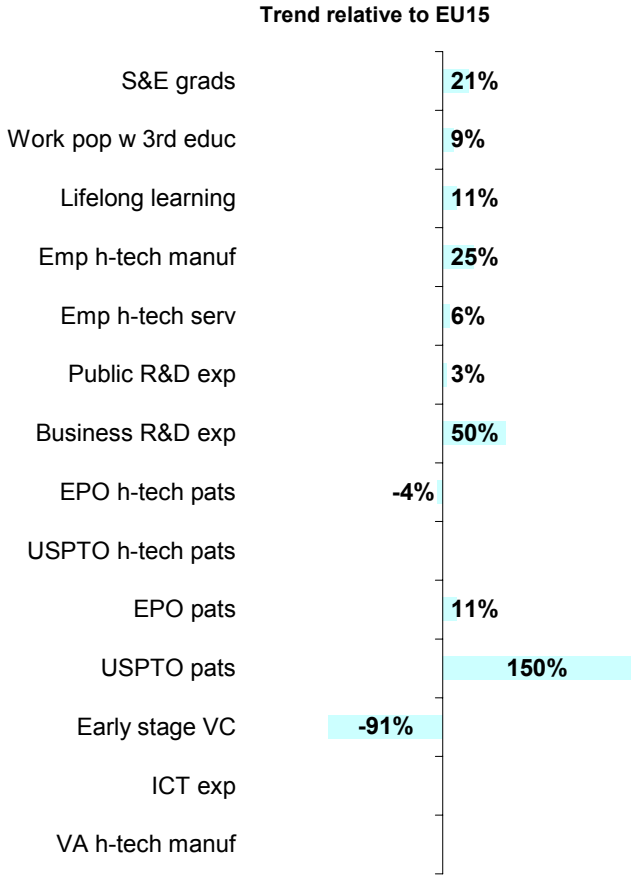
Switzerland

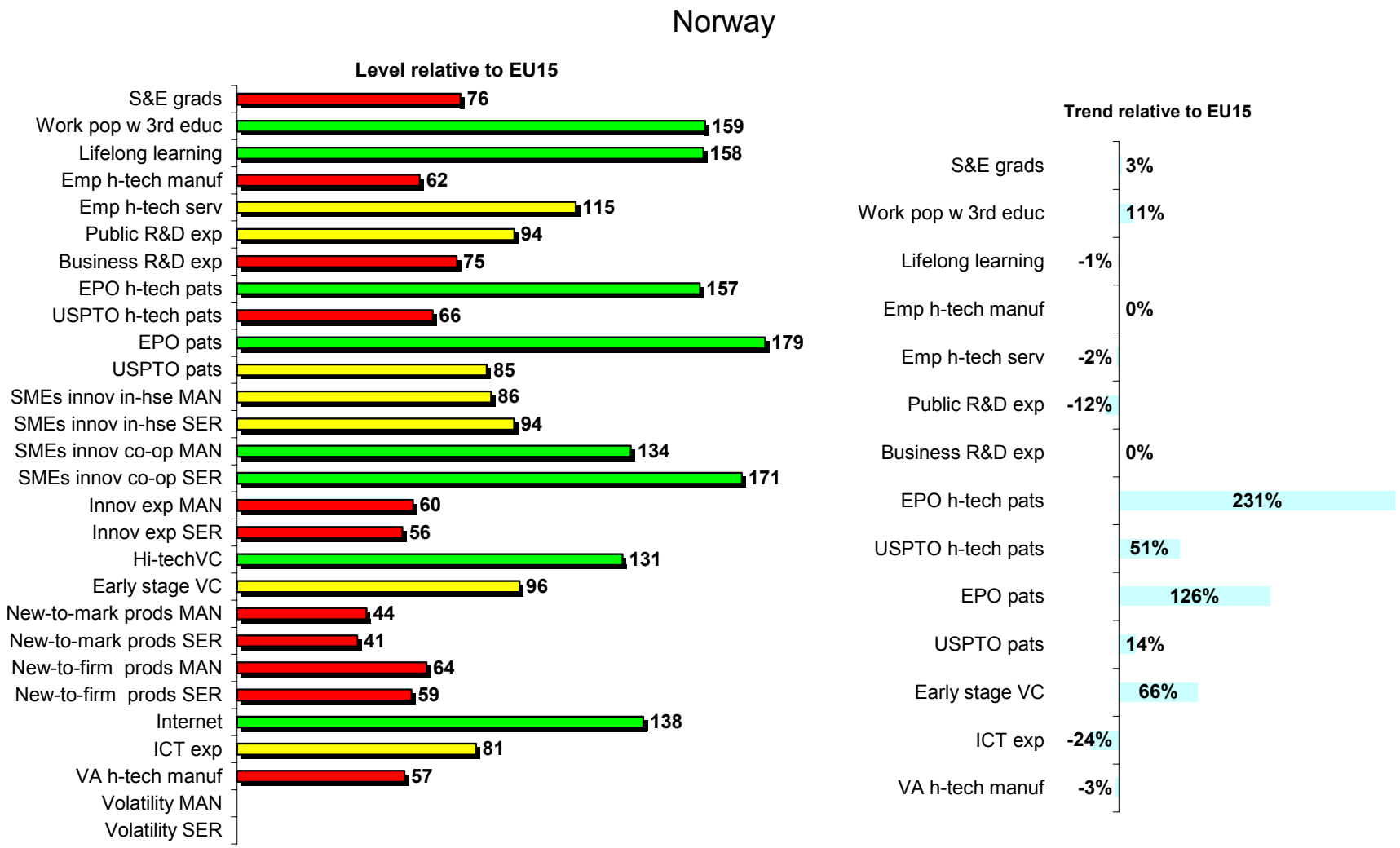




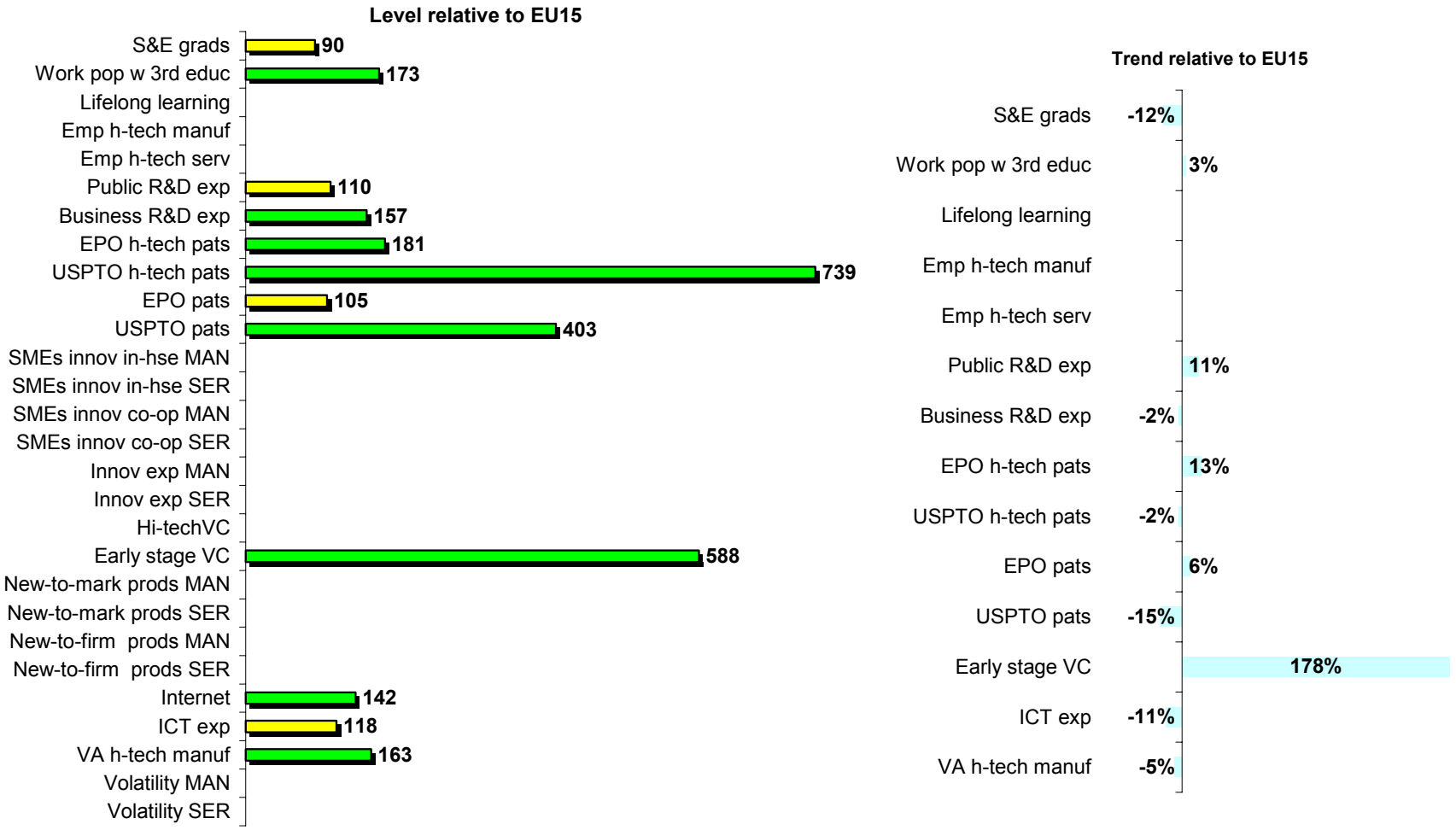
Iceland


Level relative to EU15
S&E grads 80
Work pop w 3rd educ 119
Lifelong learning 280
Emp h-tech manuf 27
Emp h-tech serv 135
Public R&D exp 193
Business R&D exp 137
EPO h-tech pats 98
USPTO h-tech pats 173
EPO pats 73
USPTO pats 106
SMEs innov in-hse MAN 120
SMEs innov in-hse SER 173
SMEs innov co-op MAN 118
SMEs innov co-op SER
Innov exp MAN 25
Innov exp SER 125
Hi-techVC 113
Early stage VC 128
New-to-mark prods MAN 17
New-to-mark prods SER 13
New-to-firm prods MAN 31
New-to-firm prods SER 16
Internet 195
ICT exp 133
VA h-tech manuf
Volatility MAN
Volatility SER

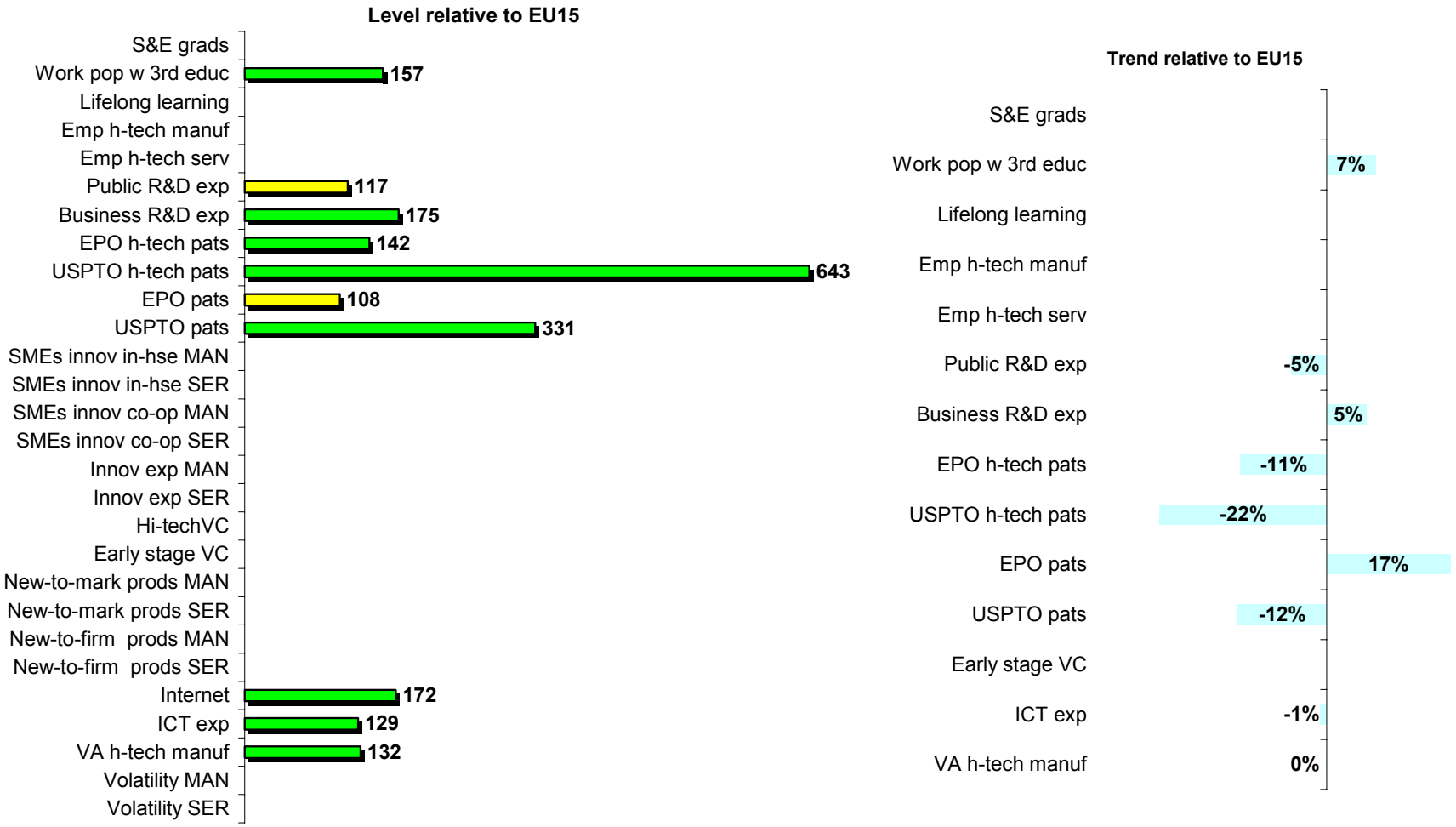

Trend relative to EU15
S&E grads 21%
Work pop w 3rd educ 9%
Lifelong learning 11%
Emp h-tech manuf 25%
Emp h-tech serv 6%
Public R&D exp 3%
Business R&D exp 50%
EPO h-tech pats -4%
USPTO h-tech pats
EPO pats 11%
USPTO pats 150%
Early stage VC -91%
ICT exp
VA h-tech manuf


Norway
Level relative to EU15
S&E grads 76
Work pop w 3rd educ 159
Lifelong learning 158
Emp h-tech manuf 62
Emp h-tech serv 115
Public R&D exp 94
Business R&D exp 75
EPO h-tech pats 157
USPTO h-tech pats 66
EPO pats 179
USPTO pats 85
SMEs innov in-hse MAN 86
SMEs innov in-hse SER 94
SMEs innov co-op MAN 134
SMEs innov co-op SER 171
Innov exp MAN 60
Innov exp SER 56
Hi-techVC 131
Early stage VC 96
New-to-mark prods MAN 44
New-to-mark prods SER 41
New-to-firm prods MAN 64
New-to-firm prods SER 59
Internet 138
ICT exp 81
VA h-tech manuf 57
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads 3%
Work pop w 3rd educ 11%
Lifelong learning -1%
Emp h-tech manuf 0%
Emp h-tech serv -2%
Public R&D exp -12%
Business R&D exp 0%
EPO h-tech pats 231%
USPTO h-tech pats 51%
EPO pats 126%
USPTO pats 14%
Early stage VC 66%
ICT exp -24%
VA h-tech manuf -3%

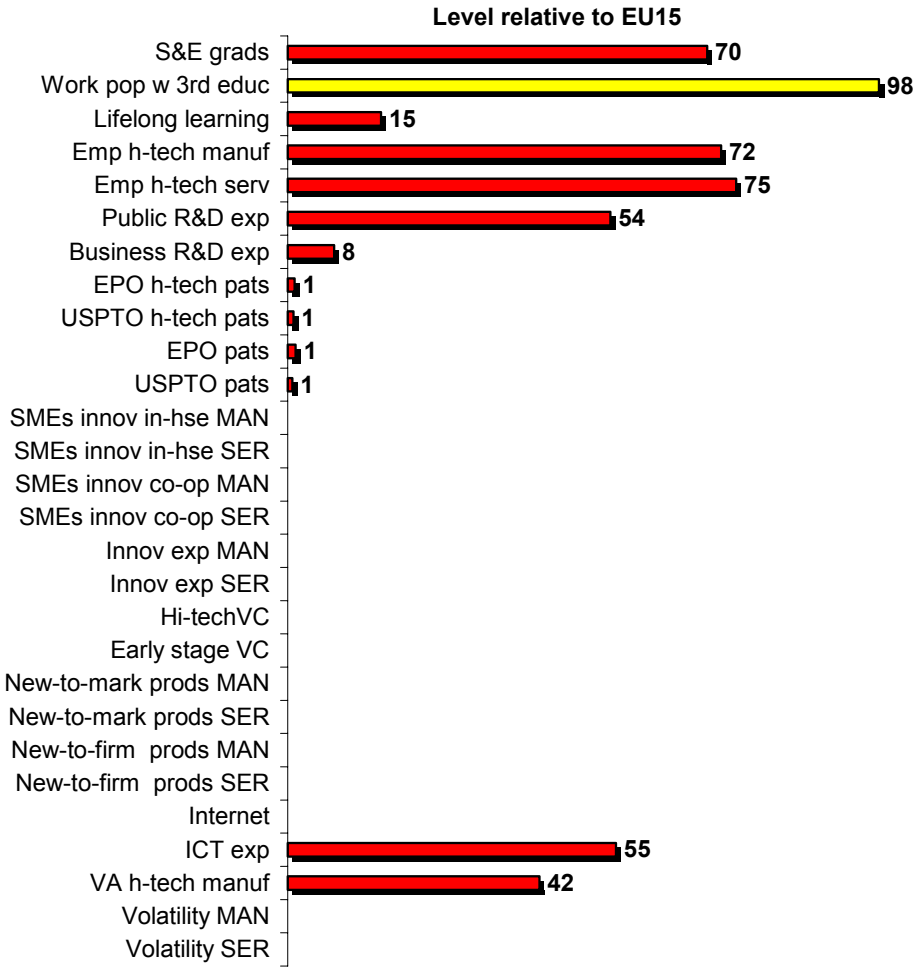
United States

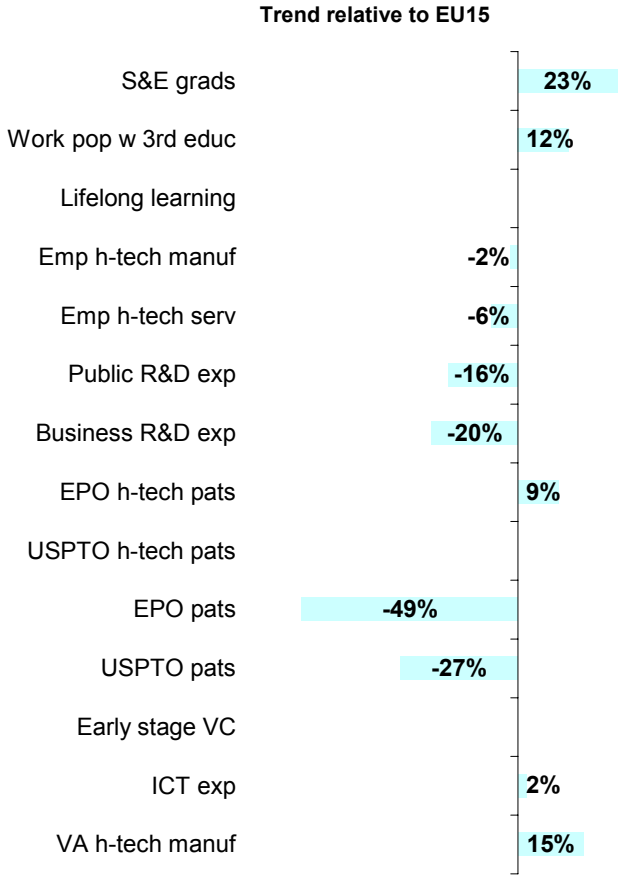


Japan

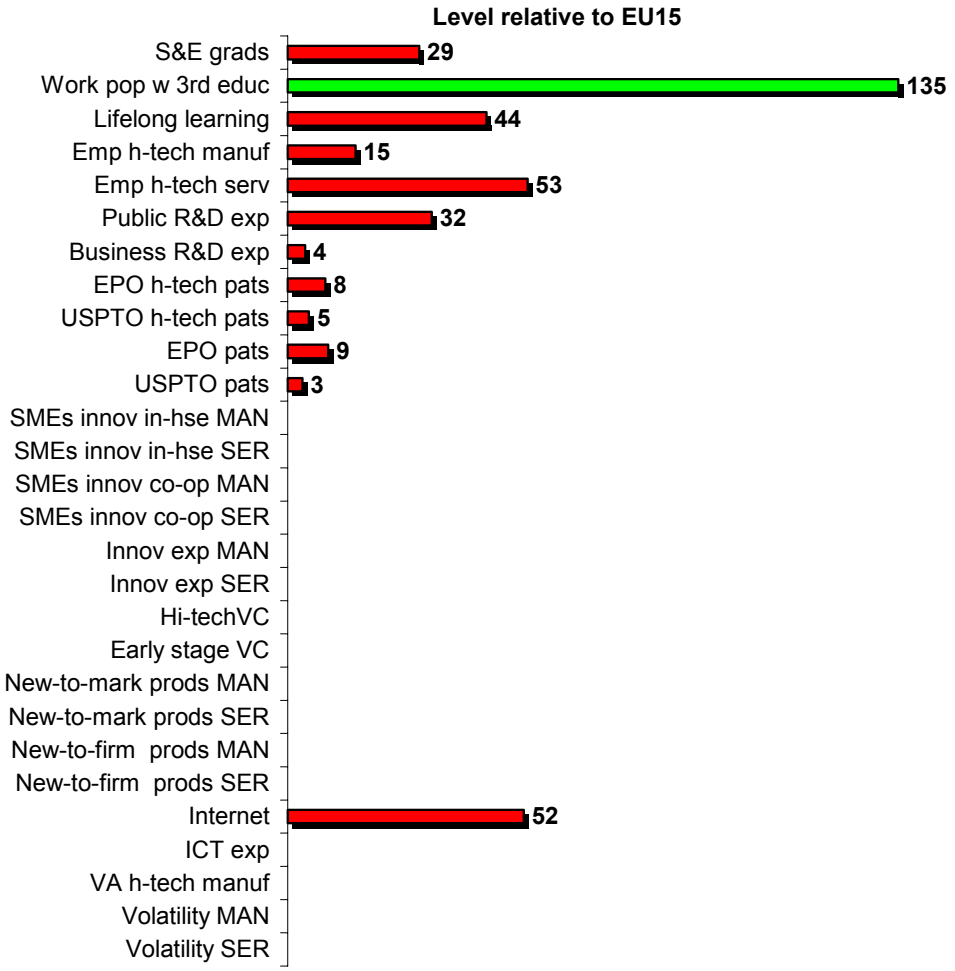

Level relative to EU15
S&E grads
Work pop w 3rd educ
157
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
117
Business R&D exp
175
EPO h-tech pats
142
USPTO h-tech pats
643
EPO pats
108
USPTO pats
331
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
172
ICT exp
129
VA h-tech manuf
132
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads
Work pop w 3rd educ
7%
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
-5%
Business R&D exp
5%
EPO h-tech pats
-11%
USPTO h-tech pats
-22%
EPO pats
17%
USPTO pats
-12%
Early stage VC
ICT exp
-1%
VA h-tech manuf
0%

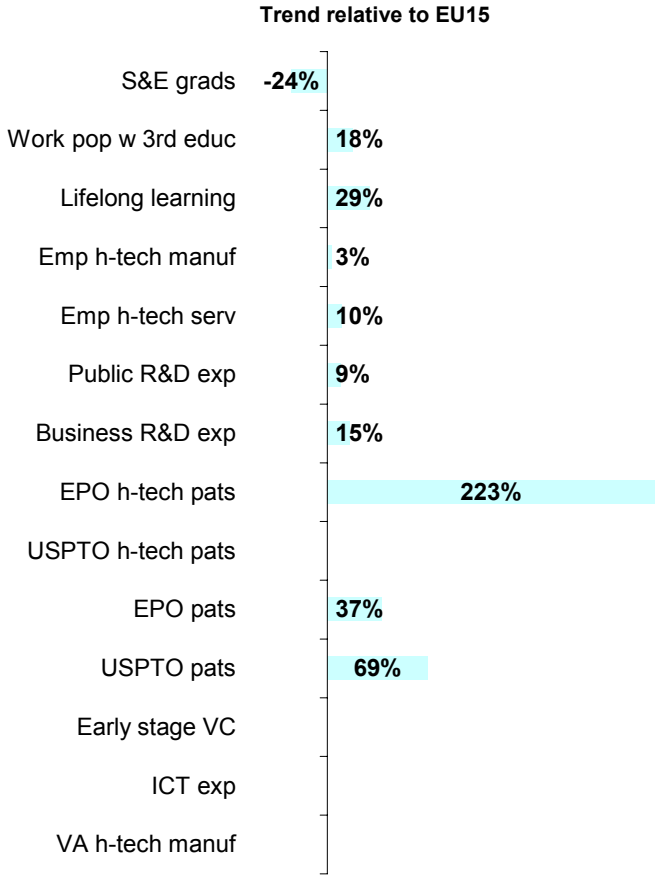
Bulgaria


Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
70
98
15
72
75
54
8
1
1
1
1
55
42

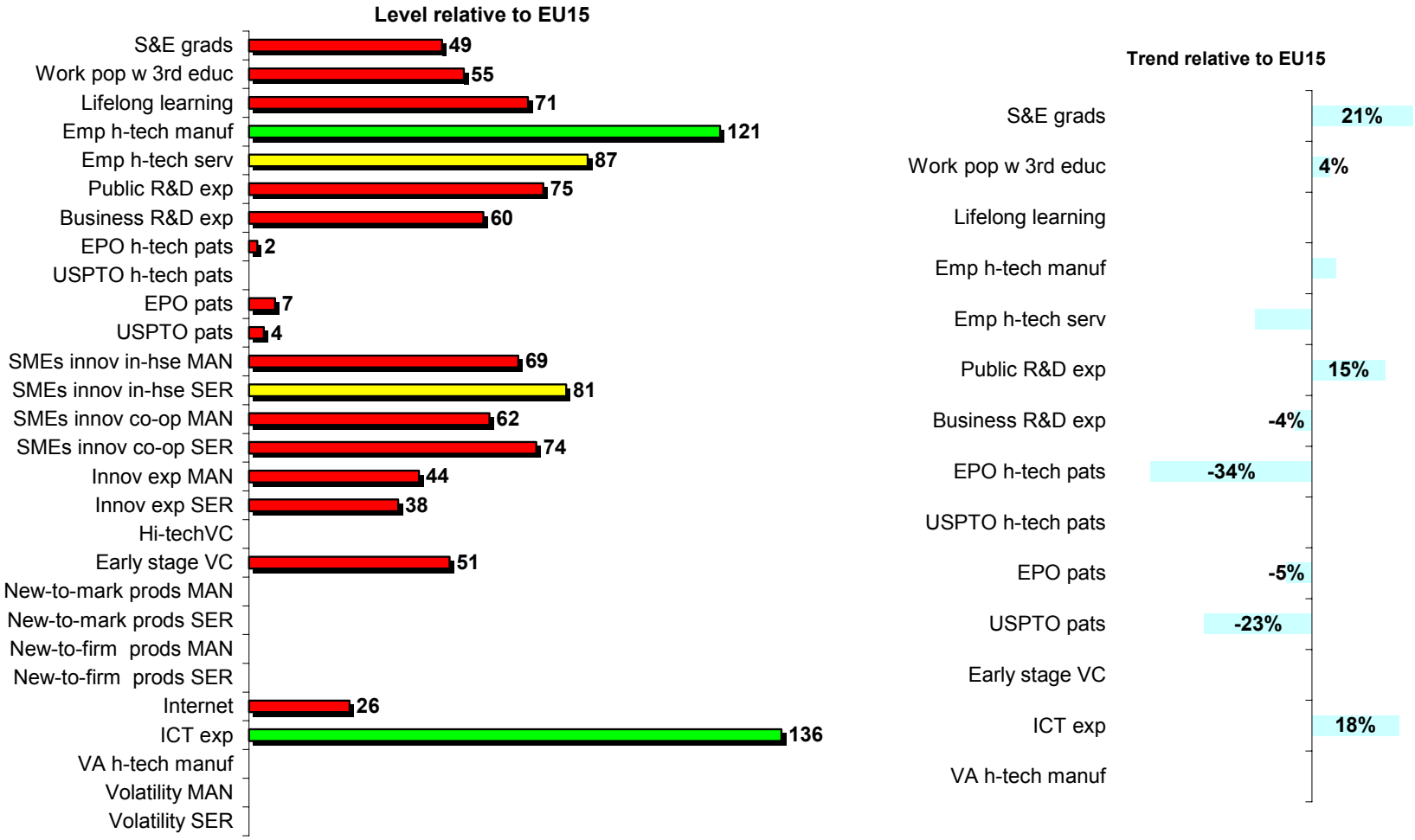

Trend relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
Early stage VC
ICT exp
VA h-tech manuf
23%
12%
-2%
-6%
-16%
-20%
9%
-49%
-27%
2%
15%

Cyprus

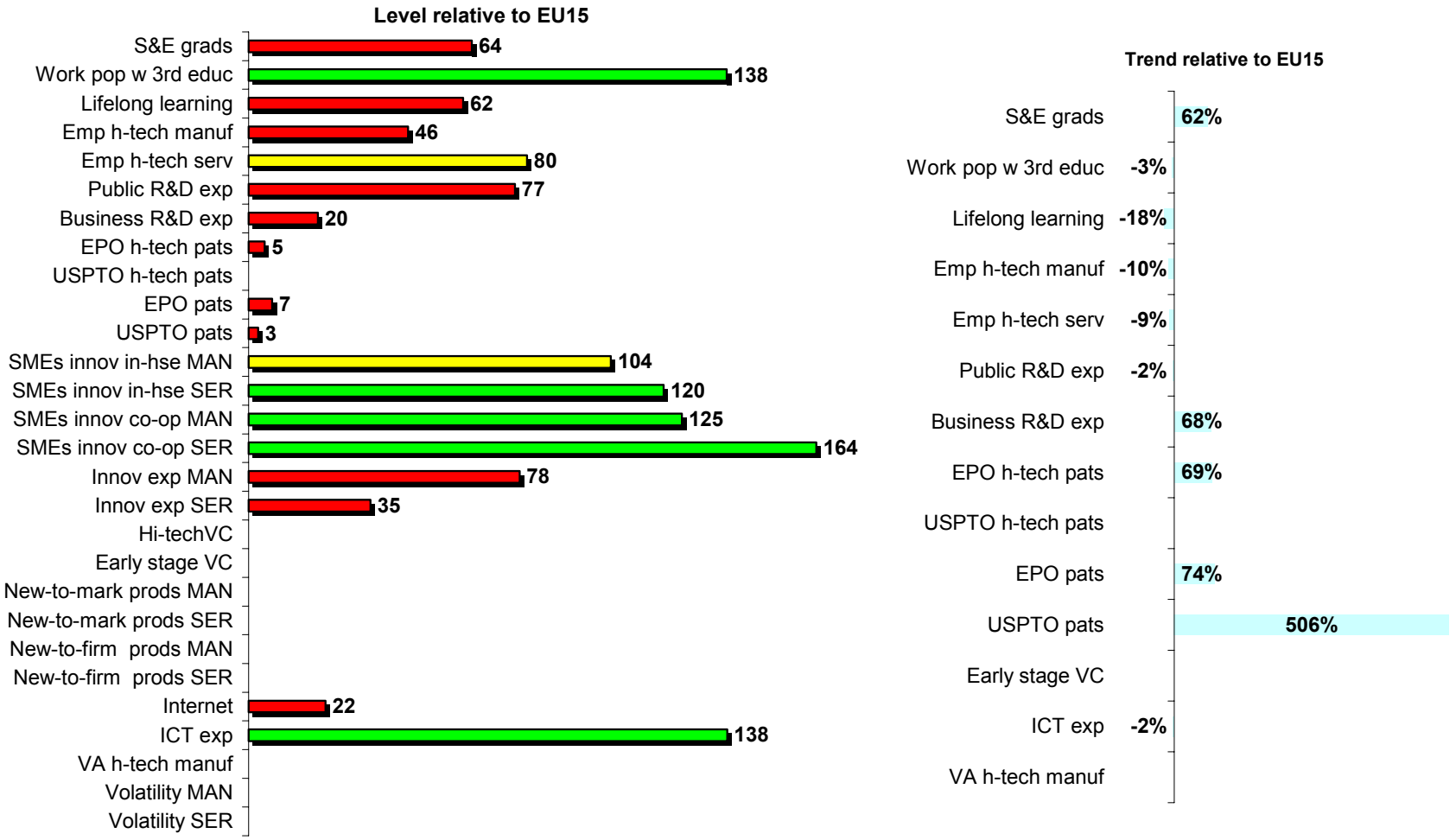

Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
29
135
44
15
53
32
4
8
5
9
3
52


Trend relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
Early stage VC
ICT exp
VA h-tech manuf
-24%
18%
29%
3%
10%
9%
15%
223%
37%
69%

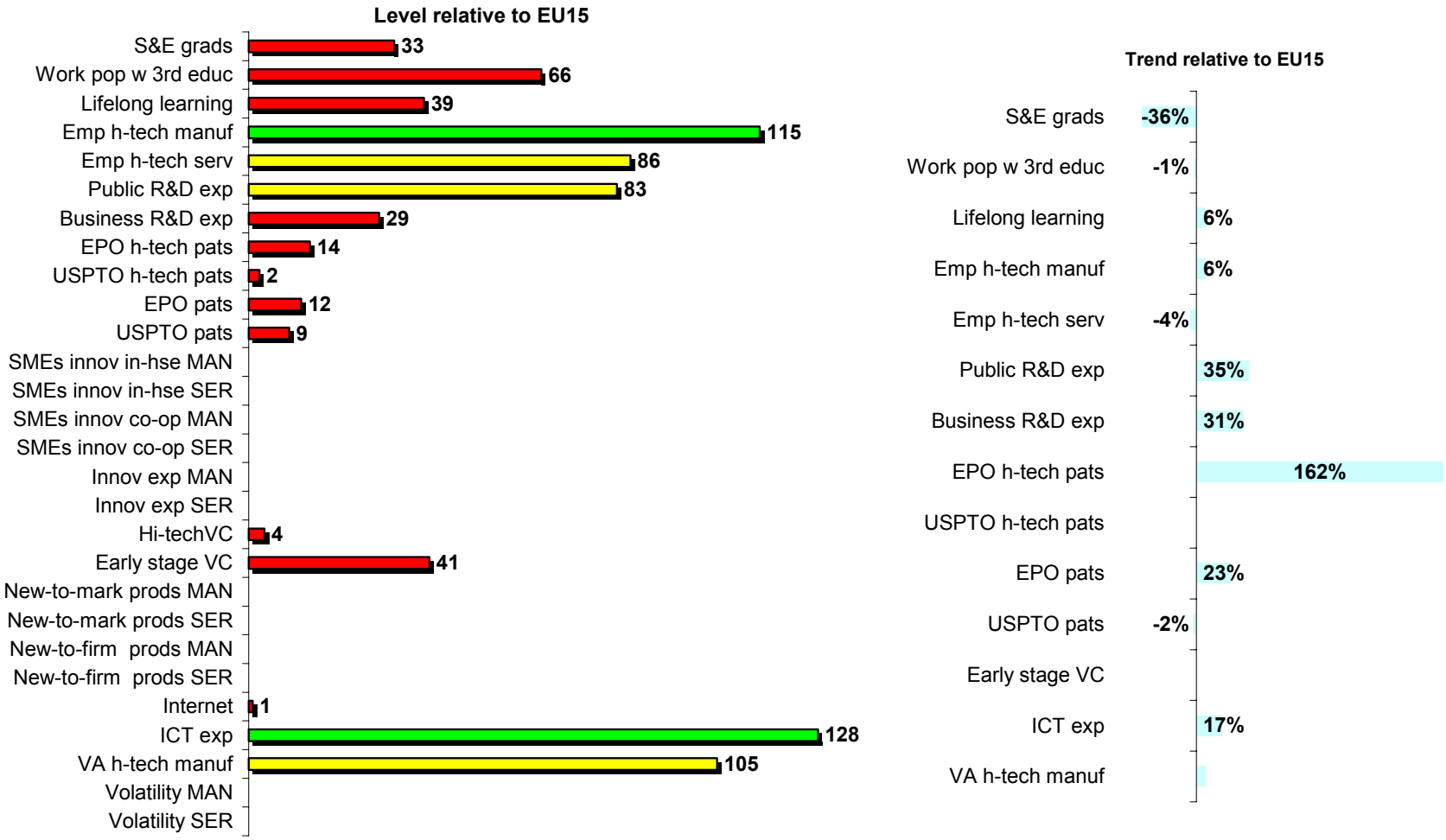
Czech Republic



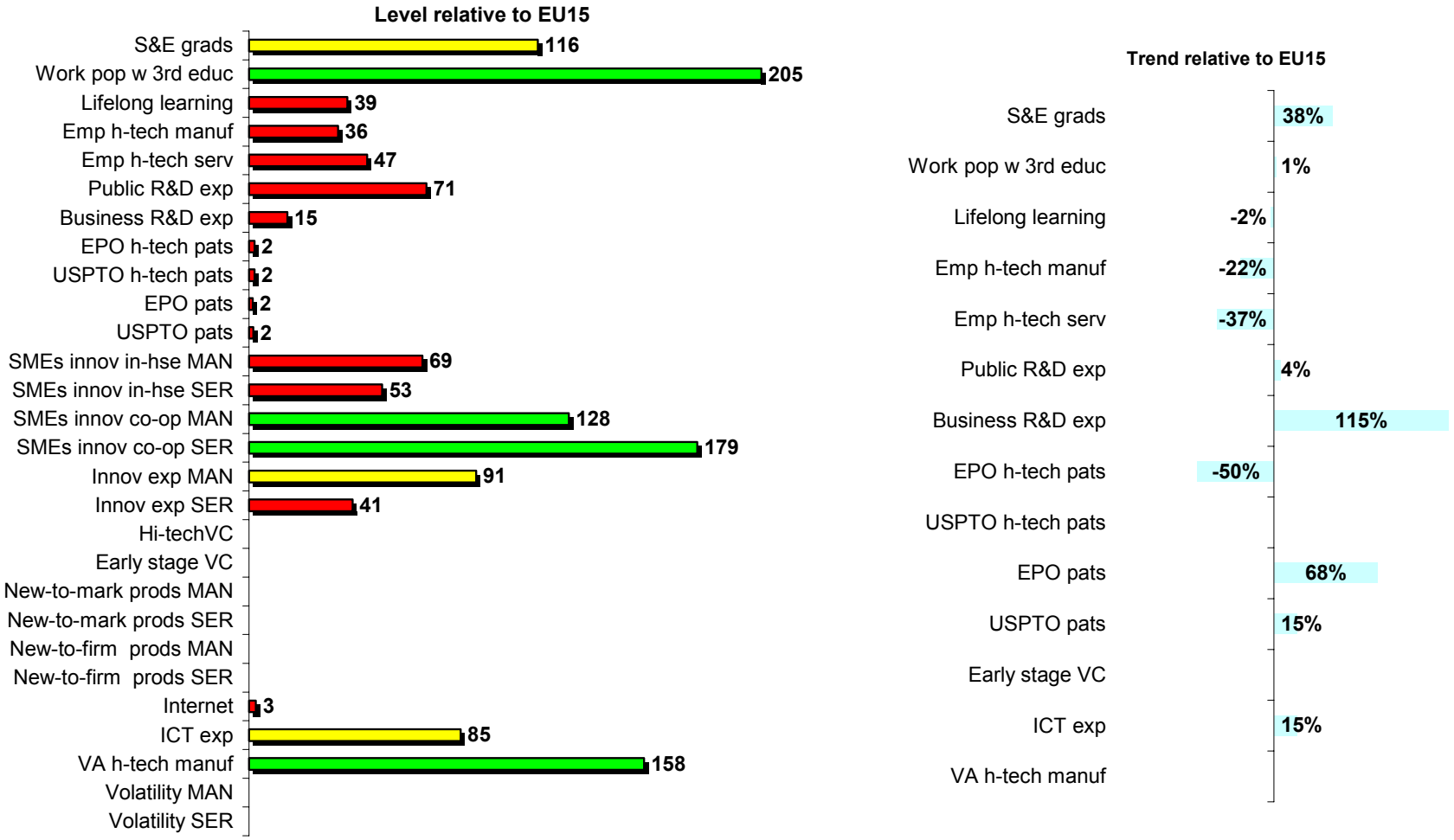
Estonia


Level relative to EU15
S&E grads 64
Work pop w 3rd educ 138
Lifelong learning 62
Emp h-tech manuf 46
Emp h-tech serv 80
Public R&D exp 77
Business R&D exp 20
EPO h-tech pats 5
USPTO h-tech pats
EPO pats 7
USPTO pats 3
SMEs innov in-hse MAN 104
SMEs innov in-hse SER 120
SMEs innov co-op MAN 125
SMEs innov co-op SER 164
Innov exp MAN 78
Innov exp SER 35
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 22
ICT exp 138
VA h-tech manuf
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads 62%
Work pop w 3rd educ -3%
Lifelong learning -18%
Emp h-tech manuf -10%
Emp h-tech serv -9%
Public R&D exp -2%
Business R&D exp 68%
EPO h-tech pats 69%
USPTO h-tech pats
EPO pats 74%
USPTO pats 506%
Early stage VC
ICT exp -2%
VA h-tech manuf

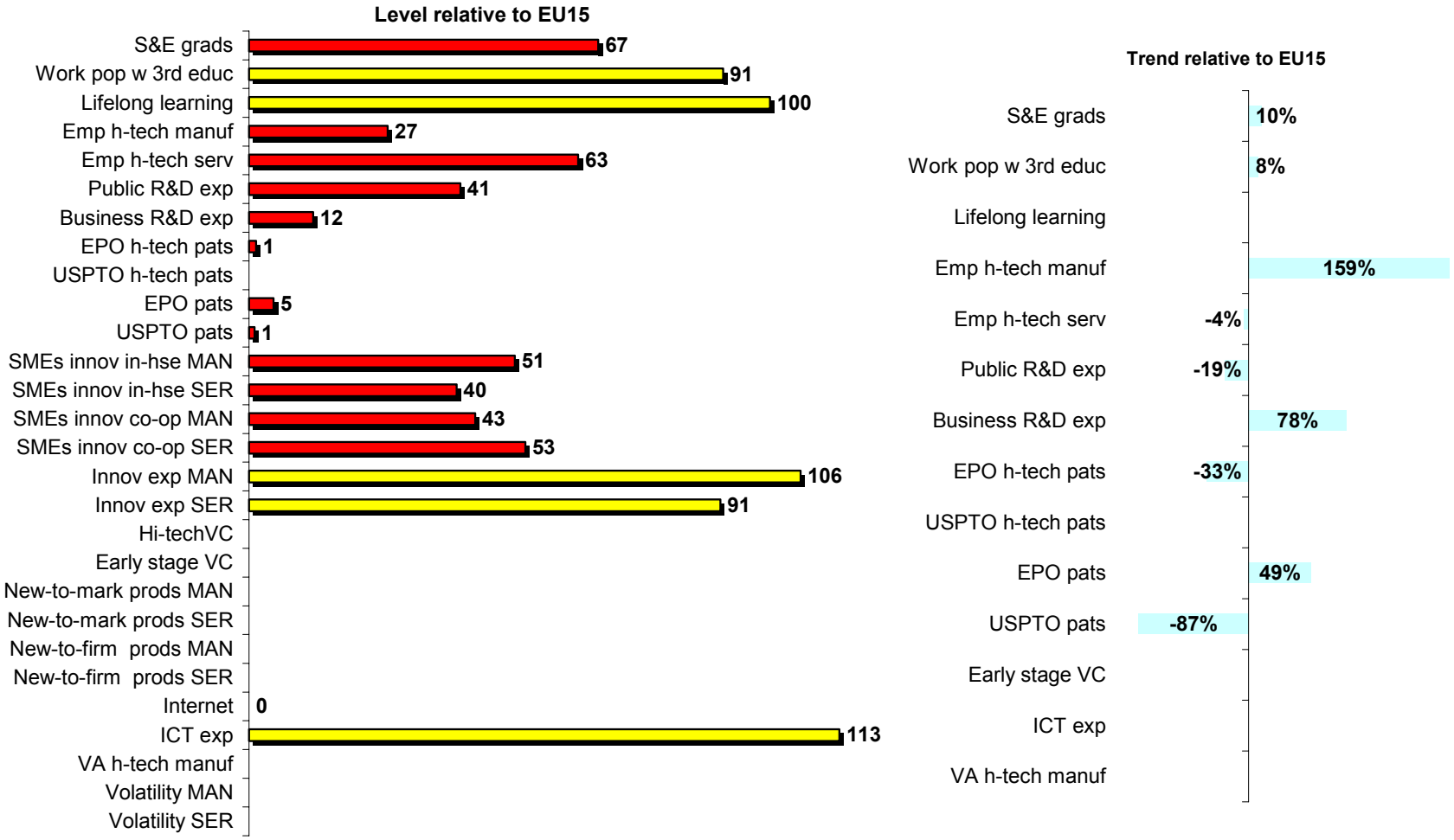
Hungary


Level relative to EU15
S&E grads 33
Work pop w 3rd educ 66
Lifelong learning 39
Emp h-tech manuf 115
Emp h-tech serv 86
Public R&D exp 83
Business R&D exp 29
EPO h-tech pats 14
USPTO h-tech pats 2
EPO pats 12
USPTO pats 9
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC 4
Early stage VC 41
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 1
ICT exp 128
VA h-tech manuf 105
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads -36%
Work pop w 3rd educ -1%
Lifelong learning 6%
Emp h-tech manuf 6%
Emp h-tech serv -4%
Public R&D exp 35%
Business R&D exp 31%
EPO h-tech pats 162%
USPTO h-tech pats
EPO pats 23%
USPTO pats -2%
Early stage VC
ICT exp 17%
VA h-tech manuf

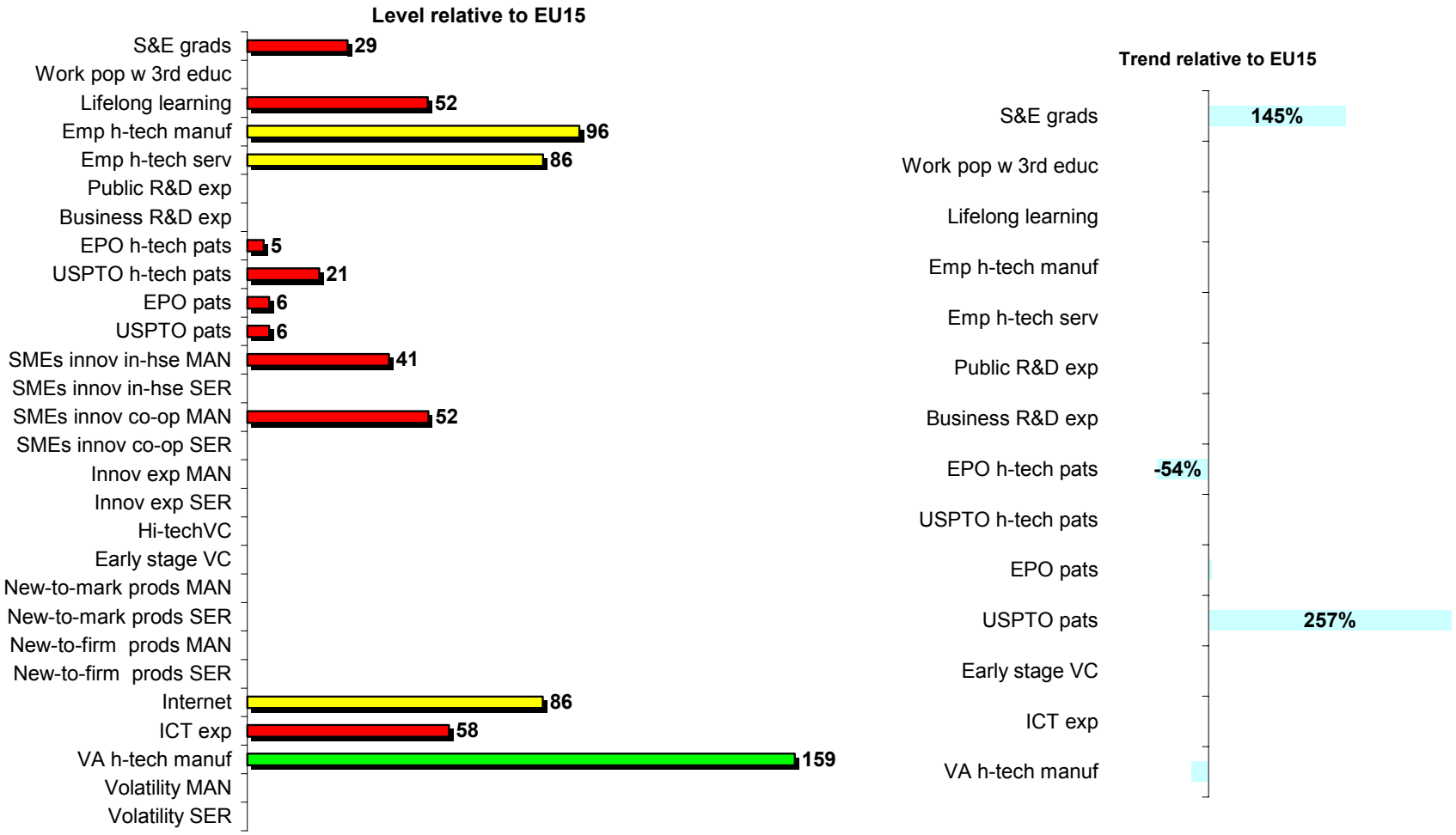
Lithuania


Level relative to EU15
S&E grads 116
Work pop w 3rd educ 205
Lifelong learning 39
Emp h-tech manuf 36
Emp h-tech serv 47
Public R&D exp 71
Business R&D exp 15
EPO h-tech pats 2
USPTO h-tech pats 2
EPO pats 2
USPTO pats 2
SMEs innov in-hse MAN 69
SMEs innov in-hse SER 53
SMEs innov co-op MAN 128
SMEs innov co-op SER 179
Innov exp MAN 91
Innov exp SER 41
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 3
ICT exp 85
VA h-tech manuf 158
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads 38%
Work pop w 3rd educ 1%
Lifelong learning -2%
Emp h-tech manuf -22%
Emp h-tech serv -37%
Public R&D exp 4%
Business R&D exp 115%
EPO h-tech pats -50%
USPTO h-tech pats
EPO pats 68%
USPTO pats 15%
Early stage VC
ICT exp 15%
VA h-tech manuf

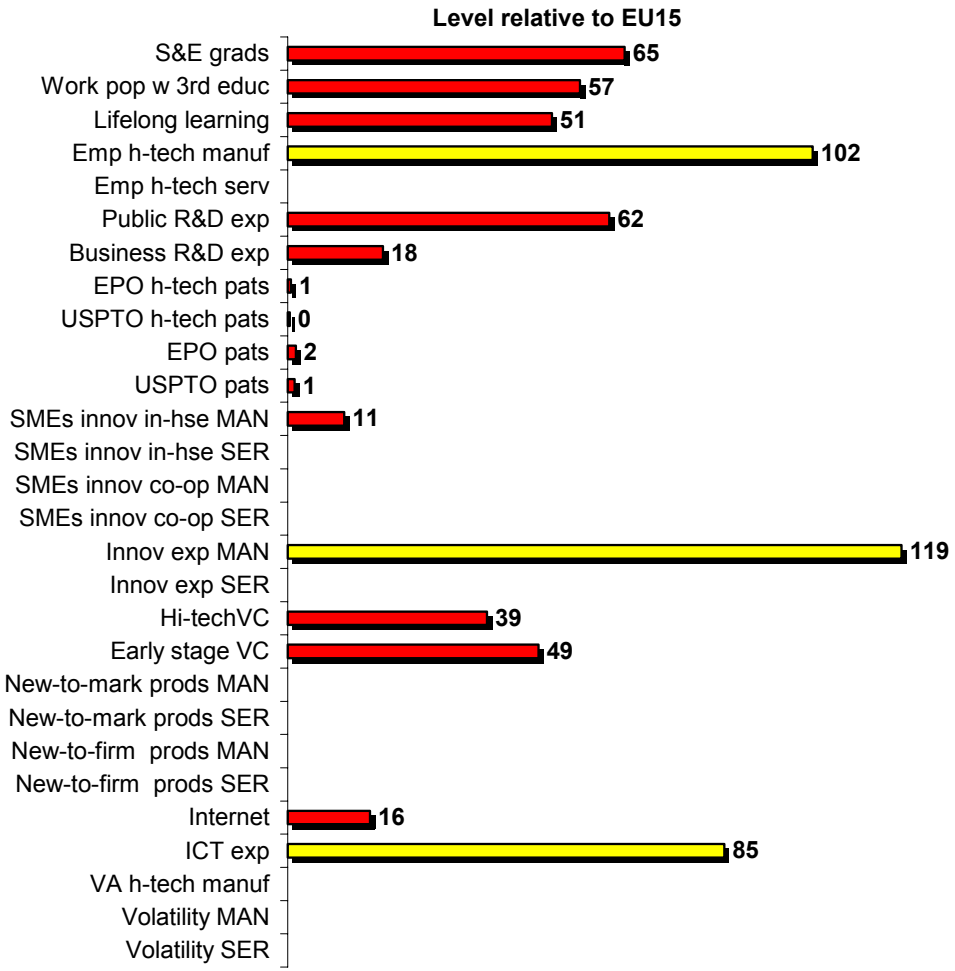
Latvia

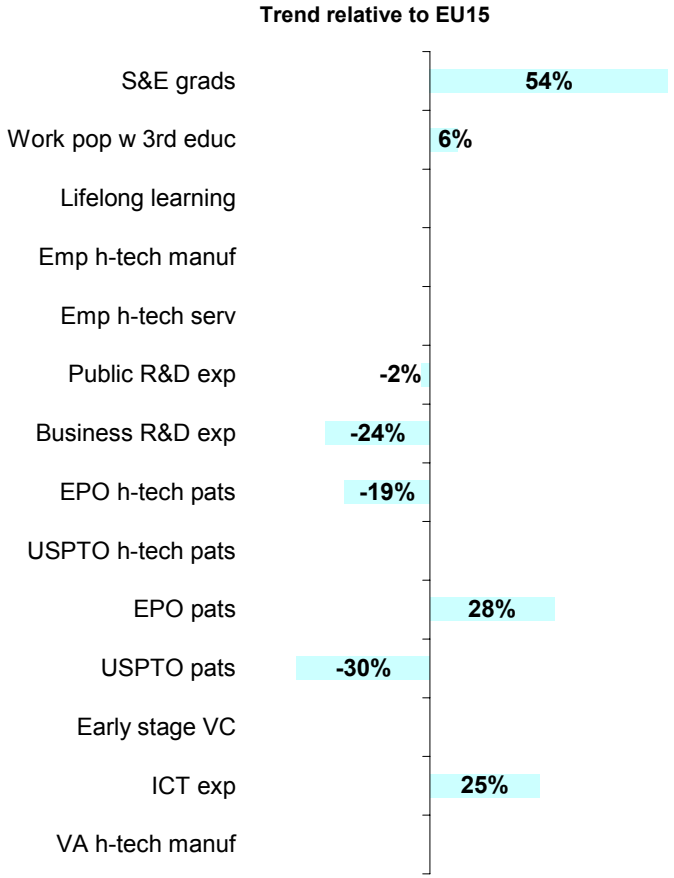

Level relative to EU15
S&E grads 67
Work pop w 3rd educ 91
Lifelong learning 100
Emp h-tech manuf 27
Emp h-tech serv 63
Public R&D exp 41
Business R&D exp 12
EPO h-tech pats 1
USPTO h-tech pats
EPO pats 5
USPTO pats 1
SMEs innov in-hse MAN 51
SMEs innov in-hse SER 40
SMEs innov co-op MAN 43
SMEs innov co-op SER 53
Innov exp MAN 106
Innov exp SER 91
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 0
ICT exp 113
VA h-tech manuf
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads 10%
Work pop w 3rd educ 8%
Lifelong learning
Emp h-tech manuf 159%
Emp h-tech serv -4%
Public R&D exp -19%
Business R&D exp 78%
EPO h-tech pats -33%
USPTO h-tech pats
EPO pats 49%
USPTO pats -87%
Early stage VC
ICT exp
VA h-tech manuf

Malta

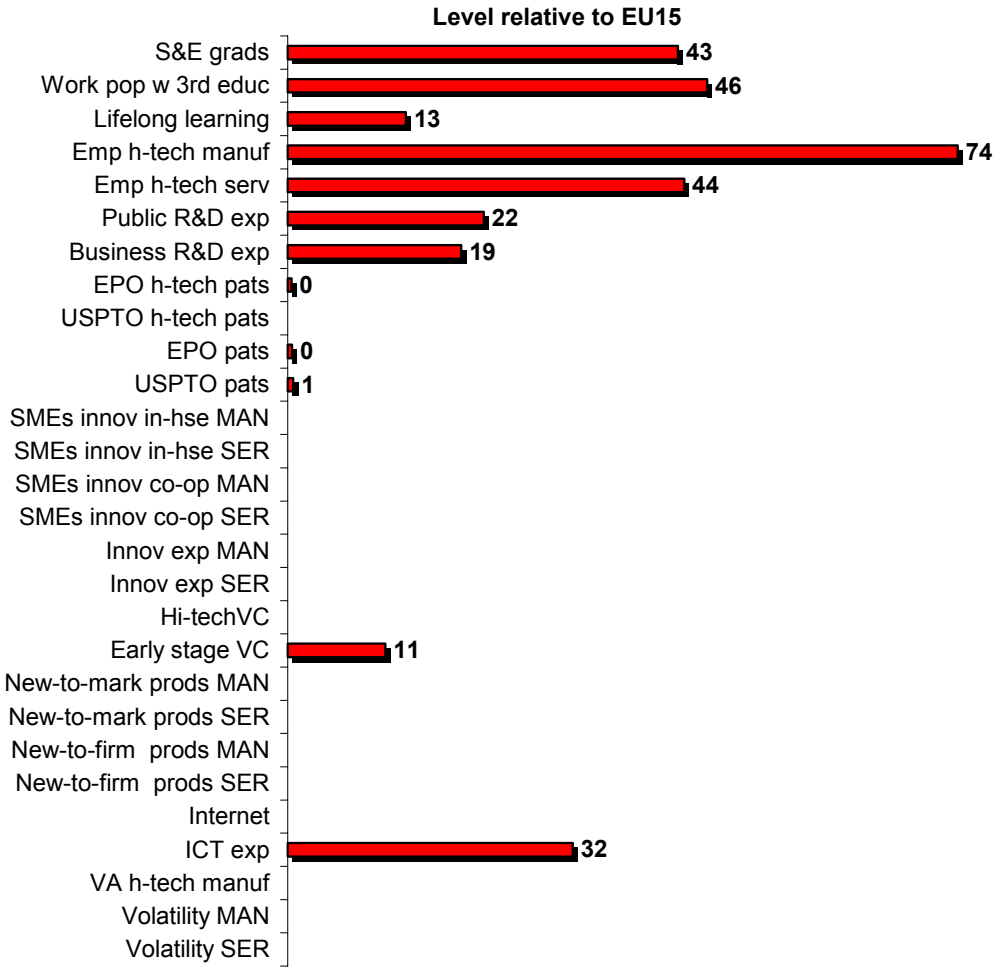

Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
29
52
96
86
5
21
6
6
41
52
86
58
159
Trend relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
Early stage VC
ICT exp
VA h-tech manuf
145%
-54%
257%

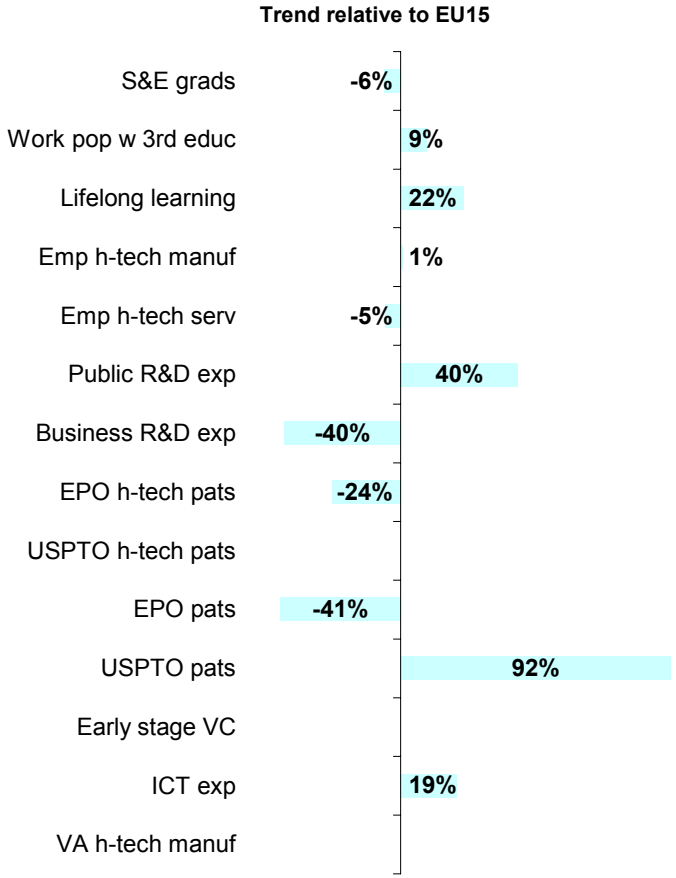
Poland


Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
65
57
51
102
62
18
1
0
2
1
11
119
39
49
16
85

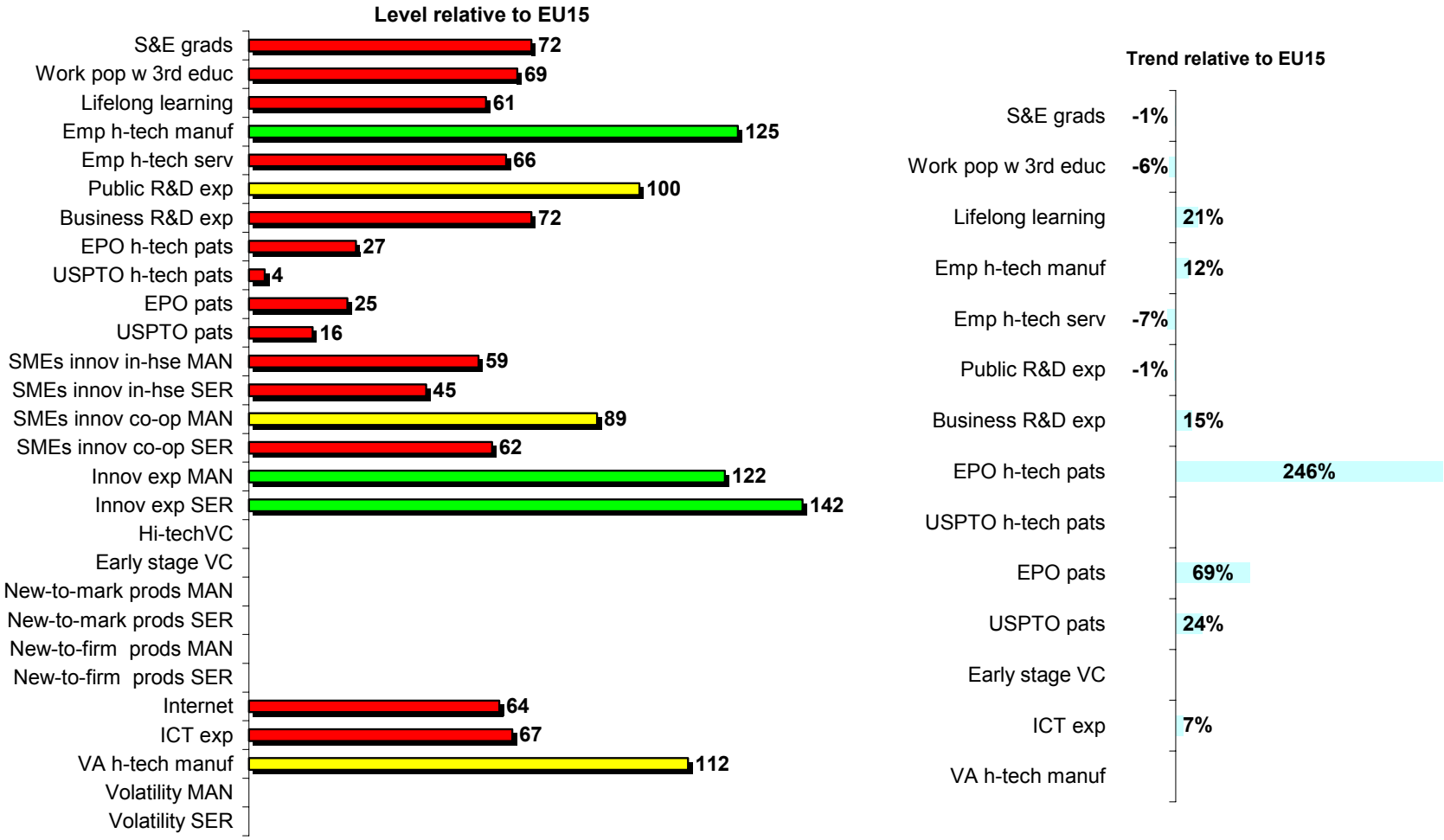

Trend relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
Early stage VC
ICT exp
VA h-tech manuf
54%
6%
-2%
-24%
-19%
28%
-30%
25%

Romania

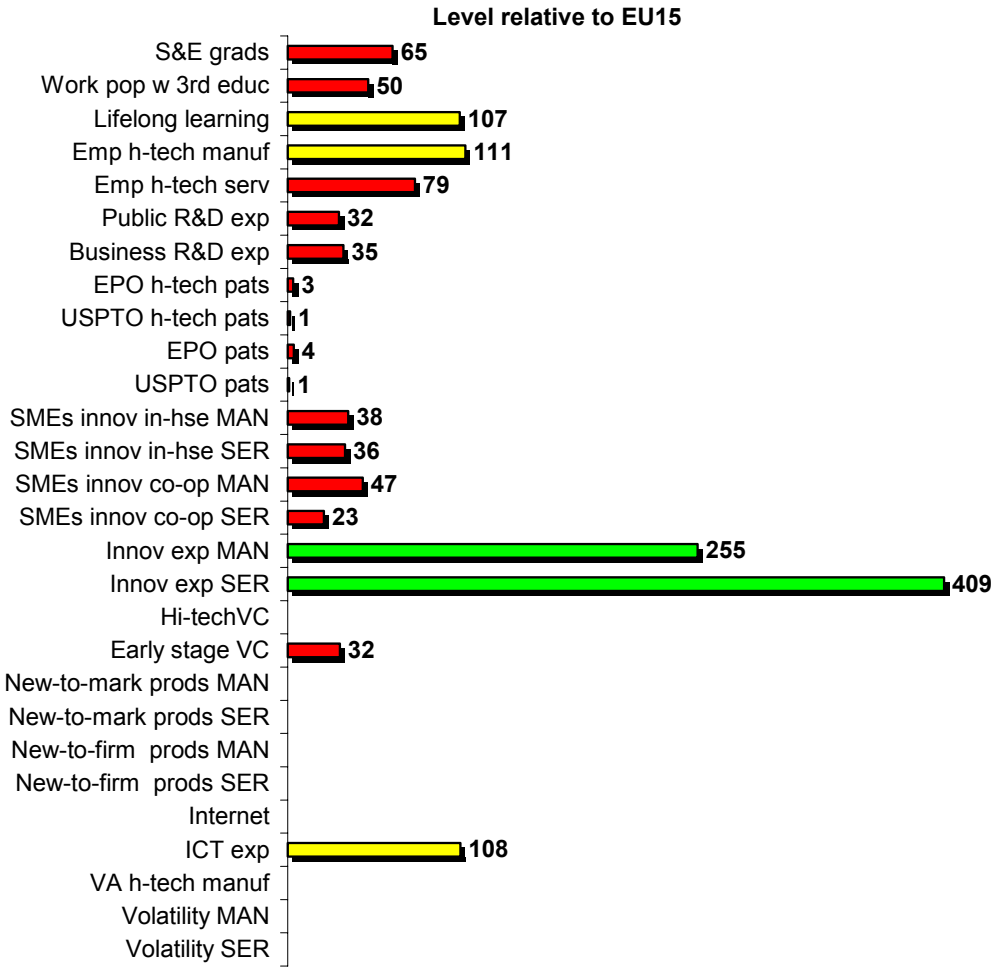

Level relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
SMEs innov in-hse MAN
SMEs innov in-hse SER
SMEs innov co-op MAN
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
VA h-tech manuf
Volatility MAN
Volatility SER
43
46
13
74
44
22
19
0
0
1
11
32

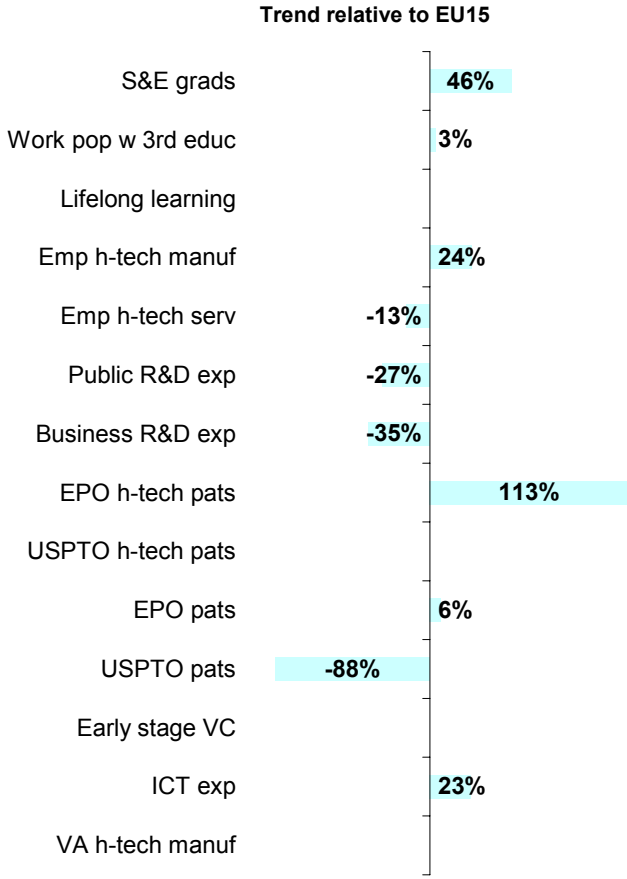

Trend relative to EU15
S&E grads
Work pop w 3rd educ
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
Business R&D exp
EPO h-tech pats
USPTO h-tech pats
EPO pats
USPTO pats
Early stage VC
ICT exp
VA h-tech manuf
-6%
9%
22%
1%
-5%
40%
-40%
-24%
-41%
92%
19%

Slovenia

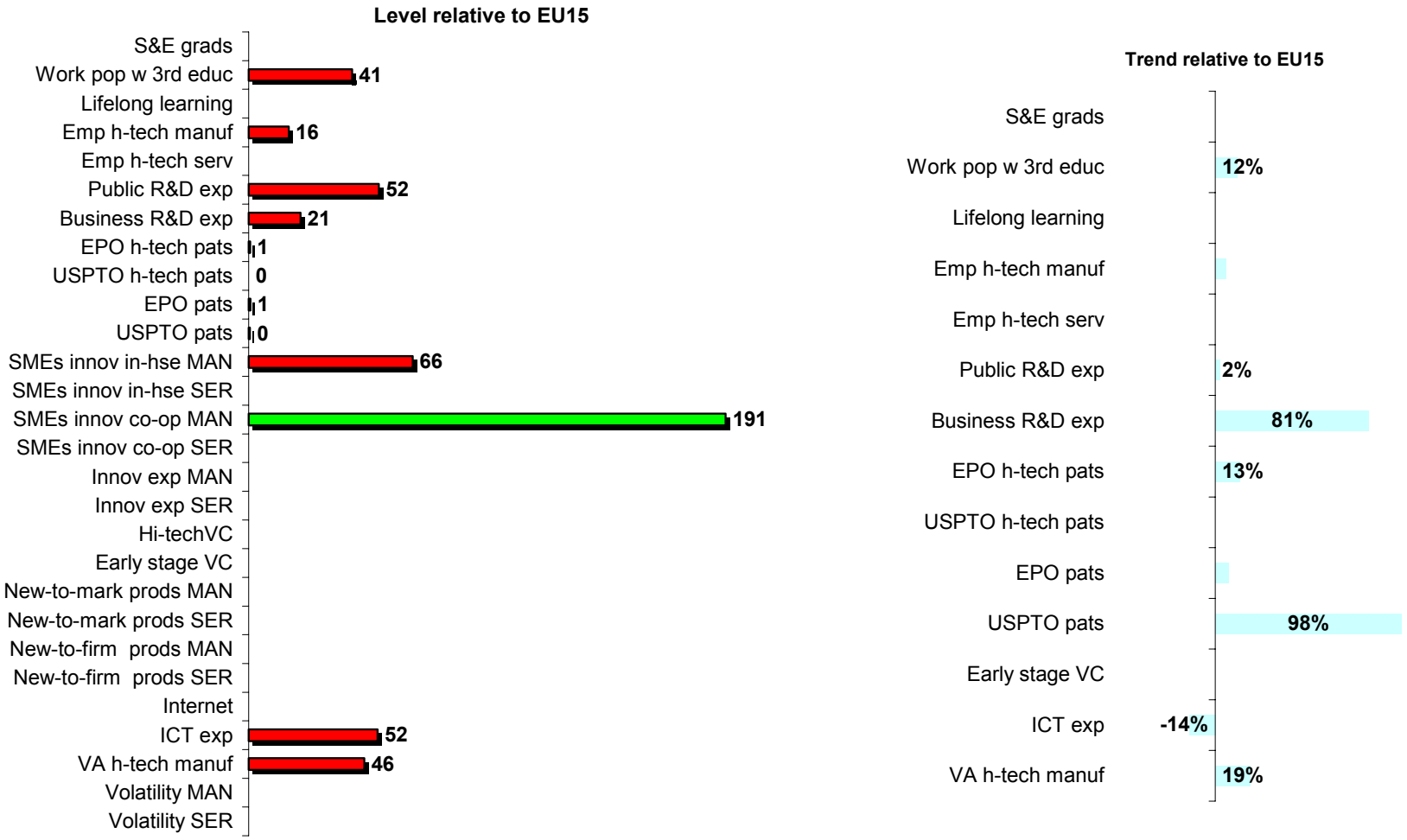

Level relative to EU15
S&E grads 72
Work pop w 3rd educ 69
Lifelong learning 61
Emp h-tech manuf 125
Emp h-tech serv 66
Public R&D exp 100
Business R&D exp 72
EPO h-tech pats 27
USPTO h-tech pats 4
EPO pats 25
USPTO pats 16
SMEs innov in-hse MAN 59
SMEs innov in-hse SER 45
SMEs innov co-op MAN 89
SMEs innov co-op SER 62
Innov exp MAN 122
Innov exp SER 142
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet 64
ICT exp 67
VA h-tech manuf 112
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads -1%
Work pop w 3rd educ -6%
Lifelong learning 21%
Emp h-tech manuf 12%
Emp h-tech serv -7%
Public R&D exp -1%
Business R&D exp 15%
EPO h-tech pats 246%
USPTO h-tech pats
EPO pats 69%
USPTO pats 24%
Early stage VC
ICT exp 7%
VA h-tech manuf

Slovakia


Level relative to EU15
S&E grads 65
Work pop w 3rd educ 50
Lifelong learning 107
Emp h-tech manuf 111
Emp h-tech serv 79
Public R&D exp 32
Business R&D exp 35
EPO h-tech pats 3
USPTO h-tech pats 1
EPO pats 4
USPTO pats 1
SMEs innov in-hse MAN 38
SMEs innov in-hse SER 36
SMEs innov co-op MAN 47
SMEs innov co-op SER 23
Innov exp MAN 255
Innov exp SER 409
Hi-techVC
Early stage VC 32
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp 108
VA h-tech manuf
Volatility MAN
Volatility SER


Trend relative to EU15
S&E grads 46%
Work pop w 3rd educ 3%
Lifelong learning
Emp h-tech manuf 24%
Emp h-tech serv -13%
Public R&D exp -27%
Business R&D exp -35%
EPO h-tech pats 113%
USPTO h-tech pats
EPO pats 6%
USPTO pats -88%
Early stage VC
ICT exp 23%
VA h-tech manuf

Turkey


Level relative to EU15
S&E grads
Work pop w 3rd educ
41
Lifelong learning
Emp h-tech manuf
16
Emp h-tech serv
Public R&D exp
52
Business R&D exp
21
EPO h-tech pats
1
USPTO h-tech pats
0
EPO pats
1
USPTO pats
0
SMEs innov in-hse MAN
66
SMEs innov in-hse SER
SMEs innov co-op MAN
191
SMEs innov co-op SER
Innov exp MAN
Innov exp SER
Hi-techVC
Early stage VC
New-to-mark prods MAN
New-to-mark prods SER
New-to-firm prods MAN
New-to-firm prods SER
Internet
ICT exp
52
VA h-tech manuf
46
Volatility MAN
Volatility SER
Trend relative to EU15
S&E grads
Work pop w 3rd educ
12%
Lifelong learning
Emp h-tech manuf
Emp h-tech serv
Public R&D exp
2%
Business R&D exp
81%
EPO h-tech pats
13%
USPTO h-tech pats
EPO pats
USPTO pats
98%
Early stage VC
ICT exp
-14%
VA h-tech manuf
19%

Annexes

Main Data Tables

Table A: European Innovation Scoreboard 2003 – Indicators and Sources

Table B: European Innovation Scoreboard 2003 – Member States, US and Japan

Table C: European Innovation Scoreboard 2003 – Associate, Acceding and Candidate countries

Table D: European Innovation Scoreboard 2003 – Most recent years used (Member States, US and Japan)

Table E: European Innovation Scoreboard 2003 – Most recent years used (Associate, Acceding and Candidate countries)

Table F: European Innovation Scoreboard 2003 – Trends (Member States, US and Japan)

Table G: European Innovation Scoreboard 2003 – Trends (Associate, Acceding and Candidate countries)

Table H: European Innovation Scoreboard 2003 – Trend base years (Member States, US and Japan)

Table I: European Innovation Scoreboard 2003 – Trend base years (Associate, Acceding and Candidate countries)

Technical Annex

Annex Table A: European Innovation Scoreboard 2003 – Indicators and Sources

No	Short definition of indicator / Source	2002 EIS	Notes [1] [2]
1.	**Human resources**		
1.1	S&E graduates (‰ of 20 – 29 years age class) / EUROSTAT: Education statistics	Identical	Structural indicator II.4.1
1.2	Population with tertiary education (% of 25 – 64 years age class) / EUROSTAT (LFS)	Identical	Included in SIS
1.3	Participation in life-long learning (% of 25 – 64 years age class) / EUROSTAT (LFS)	Identical	Structural indicator I.5.1; Included in SIS
1.4	Employment in medium-high and high-tech manufacturing (% of total workforce) / EUROSTAT (LFS)	Identical	
1.5	Employment in high-tech services (% of total workforce) / EUROSTAT (LFS)	Identical	
2.	**Knowledge creation**		
2.1	Public R&D expenditures (GERD – BERD) (% of GDP) / EUROSTAT: R&D statistics; OECD	Identical	Same data as SEC(2003) 489 ind. 1&3
2.2	Business expenditures on R&D (BERD) (% of GDP) / EUROSTAT: R&D statistics; OECD	Identical	Same data as SEC(2003) 489 ind. 1&3; Incl. in SIS
2.3.1	EPO high-tech patent applications (per million population) / EUROSTAT	Identical	SEC(2003) 489 indicator 13
2.3.2	USPTO high-tech patent applications (per million population) / USPTO	Identical	SEC(2003) 489 indicator 13
2.4.1	EPO patent applications (per million population) / EUROSTAT	New	Str. ind. II.5.1; SEC(2003) 489 ind. 12; Incl. in SIS
2.4.2	USPTO patents granted (per million population) / EUROSTAT	New	Str. ind. II.5.2; SEC(2003) 489 ind. 12; Incl. in SIS
3.	**Transmission and application of knowledge**		
3.1	SMEs innovating in-house (% of manufacturing SMEs and % of services SMEs) / EUROSTAT: CIS	Extended	SEC(2003) 489 indicator 17; Included in SIS
3.2	SMEs involved in innovation co-operation (% of manuf. SMEs and % of services SMEs) / EUROSTAT: CIS	Extended	SEC(2003) 489 indicator 18; Included in SIS
3.3	Innovation expenditures (% of all turnover in manufacturing and % of all turnover in services) / EUROSTAT: CIS	Extended	SEC(2003) 489 indicator 16; Included in SIS
4.	**Innovation finance, output and markets**		
4.1	Share of high-tech venture capital investment / EVCA	Adapted	SEC(2003) 489 indicator 15 *but 2-year average*
4.2	Share of early stage venture capital in GDP / EUROSTAT	New	Structural indicator II.6.1; SEC(2003) 489 indicator 14 *but 2-year average*
4.3.1	Sales of 'new to market' products (% of all turnover in manufacturing and % of all turnover in services) / EUROSTAT: CIS	Extended	Included in SIS
4.3.2	Sales of 'new to the firm but not new to the market' products (% of all turnover in manufacturing and % of all turnover in services) / EUROSTAT: CIS	New	Included in SIS
4.4	Internet access/use / EUROSTAT	Extended	*Composite indicator* using a.o. Structural indicator II.3.1
4.5	ICT expenditures (% of GDP) / EUROSTAT	Identical	Structural indicator II.7.1 + II.7.2
4.6	Share of manufacturing value-added in high-tech sectors / EUROSTAT: SBS	Adapted	Includes also NACE 33.
4.7	Volatility-rates of SMEs (% of manufacturing SMEs and % of services SMEs) / EUROSTAT: BDS	New	

[1] SEC(2003) 489: Commission Staff Working Paper "Investing in Research: an Action Plan for Europe", Brussels, April 30, 2003; [2] SIS: Sectoral Innovation Scoreboard.

Annex Table B: European Innovation Scoreboard 2003 – Member States, US and Japan [1]

		EU15 [2]	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	US	JP
1.1	S&E grads	11.3	10.1	11.1	8.0	--	11.3	19.6	21.7	5.7	1.8	6.1	7.2	6.4	16.0	12.4	19.5	10.2	--
1.2	Work pop w 3rd educ	21.5	28.1	27.4	22.3	17.6	24.4	23.5	25.4	10.4	18.6	24.9	16.9	9.4	32.4	26.4	29.4	37.2	33.8
1.3	Lifelong learning	8.4	6.5	18.4	5.2	1.2	5.0	2.7	7.7	4.6	5.3	16.4	7.5	2.9	18.9	18.4	22.3	--	--
1.4	Emp h-tech manuf	7.41	6.59	6.33	11.36	2.20	5.35	6.82	6.89	7.37	2.03	4.49	6.59	3.33	7.39	7.28	6.72	--	--
1.5	Emp h-tech services	3.57	3.77	4.74	3.33	1.76	2.50	4.06	4.30	3.02	2.66	4.40	3.47	1.45	4.74	5.23	4.47	--	--
2.1	Public R&D exp	0.69	0.57	0.75	0.73	0.48	0.46	0.83	0.37	0.54	0.13	0.83	0.65	0.57	1.02	0.96	0.65	0.76	0.81
2.2	Business R&D exp	1.30	1.60	1.65	1.76	0.19	0.50	1.37	0.87	0.56	1.58	1.08	1.13	0.27	2.47	3.31	1.19	2.04	2.28
2.3.1	EPO h-tech pats	31.6	23.4	42.1	48.8	2.1	3.6	30.3	30.7	6.5	10.9	68.8	18.8	0.7	136.1	100.9	35.6	57.0	44.9
2.3.2	USPTO h-tech pats	12.4	13.9	22.7	16.4	0.4	1.4	14.0	6.1	4.1	4.6	18.6	8.1	0.1	41.6	47.3	15.1	91.9	80.0
2.4.1	EPO patents	161.1	151.8	211.0	309.9	7.7	24.1	145.3	85.6	74.7	211.3	242.7	174.2	5.5	337.8	366.6	133.5	169.8	174.7
2.4.2	USPTO patents	80.1	93.3	106.0	147.4	3.4	8.7	76.5	49.1	32.7	115.6	98.5	82.6	1.9	156.1	213.7	77.2	322.5	265.2
3.1	SMEs innov in-hse manuf	37.4	46.2	16.7	55.1	16.8	29.1	33.5	--	34.9	38.8	42.5	35.5	35.5	40.9	35.5	24.8	--	--
3.1	SMEs innov in-hse serv	28.0	31.8	15.4	43.9	21.3	16.6	23.9	--	20.0	39.6	28.1	36.4	37.6	34.9	35.6	18.7	--	--
3.2	SMEs innov co-op manuf	9.4	11.7	18.9	10.9	4.9	3.2	12.3	--	2.8	--	11.1	7.4	6.1	22.0	14.1	9.6	--	--
3.2	SMEs innov co-op serv	7.1	7.7	12.7	8.4	12.4	1.9	5.4	--	3.5	--	8.5	10.1	9.2	18.3	12.8	7.6	--	--
3.3	Innov exp manuf	3.45	4.92	0.95	4.71	2.22	1.87	3.08	--	2.96	2.08	3.07	2.83	2.86	3.91	6.42	2.96	--	--
3.3	Innov exp serv	1.83	0.92	0.36	1.64	1.60	0.65	1.57	--	0.84	1.18	0.79	0.92	2.66	0.96	19.11	1.39	--	--
4.1	Hi-tech VC	45.4	53.5	31.0	--	27.9	30.2	70.7	54.1	71.2	--	35.1	55.7	45.9	57.5	44.2	30.5	--	--
4.2	Early stage VC	0.037	0.041	0.080	0.042	0.017	0.016	0.035	0.027	0.015	--	0.044	0.017	0.011	0.087	0.098	0.047	0.218	--
4.3.1	New-to-mark prods manuf	10.5	6.9	14.3	7.1	4.4	11.9	9.5	--	18.7	--	--	8.4	16.0	27.2	3.5	9.5	--	--
4.3.1	New-to-mark prods serv	7.4	7.4	7.5	3.7	17.9	13.7	5.5	--	11.6	2.7	--	4.3	9.5	12.2	9.3	--	--	--
4.3.2	New-to-firm prods manuf	28.6	15.8	24.2	40.3	18.4	25.8	17.5	--	30.1	13.6	23.8	23.1	21.6	31.1	32.1	--	--	--
4.3.2	New-to-firm prods serv	18.8	23.5	18.4	16.4	37.1	26.4	17.1	--	20.5	9.0	13.9	12.8	16.1	18.8	23.7	--	--	--
4.4	Internet access/use	0.51	0.58	0.93	0.66	0.05	0.25	0.50	0.55	0.38	0.59	0.74	0.68	0.25	0.76	0.97	0.53	0.73	0.88
4.5	ICT expenditures	7.0	7.3	7.4	6.9	5.1	4.4	7.4	5.3	5.2	8.0	8.3	6.3	5.4	6.8	9.8	8.6	8.2	9.0
4.6	VA h-tech manuf	14.1	13.1	15.0	11.9	6.3	6.5	18.3	30.6	9.9	3.2	12.1	11.5	6.5	24.9	15.9	18.8	23.0	18.7
4.7	Volatility manuf	12.7	10.7	12.7	--	--	14.2	--	--	12.8	12.8	12.8	--	13.3	12.5	10.3	16.0	--	--
4.7	Volatility serv	16.6	16.8	20.4	--	--	17.1	--	--	17.2	--	18.5	--	14.7	15.8	13.2	20.2	--	--

[1] Data in italics are not directly comparable with those originating from Eurostat as these were either taken from national sources or due to (small) differences in definitions. Technical Paper No 2 provides more details. [2] For indicator 1.1 the EU mean is calculated as a weighted average using population shares of 20-29 years of age. For the CIS-indicators the EU mean is calculated as a weighted average using GDP shares.

Annex Table C: European Innovation Scoreboard 2003 – Associate, Acceding and Candidate countries [1]

		EU15 [2]	CH	IS	NO	BG	CY	CZ [3]	EE [3]	HU	LT [3]	LV [3]	MT	PL	RO	SI [3]	SK [3]	TR
1.1	S&E grads	11.3	7.6	9.1	8.6	7.9	3.3	5.6	7.3	3.7	13.1	7.6	3.3	7.4	4.9	8.2	7.4	--
1.2	Work pop w 3rd educ	21.5	25.2	25.6	34.2	21.1	29.1	11.8	29.6	14.1	44.0	19.6	--	12.2	10.0	14.8	10.8	8.9
1.3	Lifelong learning	8.4	*18.2*	23.5	13.3	1.3	3.7	6.0	5.2	3.3	3.3	8.4	4.4	4.3	1.1	5.1	9.0	--
1.4	Emp h-tech manuf	7.41	7.75	2.02	4.60	5.34	1.11	8.94	3.41	8.50	2.64	1.97	7.14	7.54	5.50	9.28	8.21	*1.19*
1.5	Emp h-tech services	3.57	3.97	4.81	4.11	2.66	1.90	3.09	2.87	3.06	1.69	2.26	3.06	--	1.57	2.35	2.83	--
2.1	Public R&D exp	0.69	0.68	1.33	0.65	0.37	0.22	0.52	0.53	0.57	0.49	0.28	--	0.43	0.15	0.69	0.22	0.36
2.2	Business R&D exp	1.30	1.95	1.78	0.97	0.10	0.05	0.78	0.26	0.38	0.20	0.16	--	0.24	0.25	0.94	0.45	0.27
2.3.1	EPO h-tech pats	31.6	--	31.0	49.6	0.4	2.6	0.7	1.5	4.3	0.7	0.4	*1.5*	0.2	0.1	8.6	1.1	0.2
2.3.2	USPTO h-tech pats	12.4	21.2	21.5	8.3	0.1	0.6	--	--	0.3	0.3	--	*2.6*	0.1	--	0.5	0.2	0.0
2.4.1	EPO patents	161.1	327.1	117.2	288.8	2.1	14.5	10.7	11.0	19.0	2.4	7.6	10.2	2.5	0.8	40.7	6.1	1.1
2.4.2	USPTO patents	80.1	230.8	84.7	67.9	0.6	2.6	3.0	2.2	7.3	1.4	0.8	5.1	1.1	0.5	13.1	0.7	0.4
3.1	SMEs innov in-hse manuf	37.4	58.0	44.8	32.3	--	--	25.8	39.1	--	26.0	19.1	*15.4*	*4.1*	--	22.0	14.1	*24.6*
3.1	SMEs innov in-hse serv	28.0	50.1	48.4	26.3	--	--	22.7	33.5	--	14.9	11.2	--	--	--	12.7	10.0	--
3.2	SMEs innov co-op manuf	9.4	13.0	11.1	12.6	--	--	5.8	11.8	--	12.1	4.1	*4.9*	--	--	8.4	4.4	*18.0*
3.2	SMEs innov co-op serv	7.1	6.5	--	12.1	--	--	5.2	11.6	--	12.7	3.8	--	--	--	4.4	1.6	--
3.3	Innov exp manuf	3.45	4.29	0.85	2.06	--	--	1.50	2.70	--	3.13	3.65	--	*4.10*	--	4.20	8.80	--
3.3	Innov exp serv	1.83	2.81	2.29	1.03	--	--	0.70	0.65	--	0.76	1.66	--	--	--	2.60	7.50	--
4.1	Hi-tech VC	45.4	50.3	51.2	59.4	--	--	--	--	1.6	--	--	--	17.5	--	--	--	--
4.2	Early stage VC	0.037	--	0.048	0.036	--	--	0.019	--	0.015	--	--	--	0.018	0.004	--	0.012	--
4.3.1	New-to-mark prods manuf	10.5	--	1.8	4.6	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.1	New-to-mark prods serv	7.4	--	1.0	3.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.2	New-to-firm prods manuf	28.6	20.7	8.9	18.4	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.2	New-to-firm prods serv	18.8	20.4	3.0	11.2	--	--	--	--	--	--	--	--	--	--	--	--	--
4.4	Internet access/use	0.51	--	1.00	0.71	--	0.27	0.13	0.11	0.00	0.01	0.00	*0.44*	0.08	--	0.33	--	--
4.5	ICT expenditures [4]	7.0	10.2	9.3	5.7	3.8	--	9.5	*9.6*	8.9	*5.9*	*7.9*	*4.1*	5.9	2.2	4.7	7.5	3.6
4.6	VA h-tech manuf	14.1	22.7	--	8.0	*5.9*	--	--	--	*14.9*	*22.3*	--	*22.4*	--	--	*15.9*	--	*6.6*
4.7	Volatility manuf	12.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4.7	Volatility serv	16.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] Data in italics are not directly comparable with those originating from Eurostat as these were either taken from national sources or due to (small) differences in definitions. Technical Paper No 2 provides more details. [2] For indicator 1.1 the EU mean is calculated as a weighted average using population shares of 20-29 years of age. For the CIS-indicators the EU mean is calculated as a weighted average using GDP shares. [3] CIS3 data for CZ, EE, LT, LV, SI and SK are not to be considered as completely comparable with the MS data since the methodology in some cases is different and the data processing has not been harmonised. Eurostat will provide harmonised data in 2004. [4] Data for CH, BG, CZ, HU, PL, RO, SI, SK and TR were taken from WITSA/IDC.

Annex Table D: European Innovation Scoreboard 2003 – Most recent years used (Member States, US and Japan) **

		EU15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	US	JP
1.1	S&E grads	2000	2001	2000	2001	--	2001	2000	2001	2000	2000	2001	2001	2001	2000	2001	2001	2000	--
1.2	Work pop w 3rd educ	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2001	2001
1.3	Lifelong learning	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	--	--
1.4	Emp h-tech manuf	2002	2002	2002	2002	2002	2002	2002	2002	2002	2000	2002	2002	2002	2002	2002	2002	--	--
1.5	Emp h-tech services	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	--	--
2.1	Public R&D exp	2002	2001	2001	2001	1999	2001	2002	2001	2000	2000	2000	1998	2001	2002	2001	2002	2002	2001
2.2	Business R&D exp	2002	2001	2001	2001	1999	2001	2002	1999	2001	2000	2001	1998	2001	2002	2001	2002	2002	2001
2.3.1	EPO h-tech pats	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
2.3.2	USPTO h-tech pats	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	1997	2000	2000	2000	2000	2000
2.4.1	EPO patents	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
2.4.2	USPTO patents	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
3.1	SMEs innov in-hse manuf	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
3.1	SMEs innov in-hse serv	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
3.2	SMEs innov co-op manuf	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
3.2	SMEs innov co-op serv	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
3.3	Innov exp manuf	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
3.3	Innov exp serv	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--	--
4.1	Hi-tech VC	2001*	2001*	2001*	--	2001	2001*	2001*	2001*	2001*	--	2001*	2001*	2001*	2001*	2001*	2001*	--	--
4.2	Early stage VC	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	--	2002*	2002*	2002*	2002*	2002*	2002*	2001*	--
4.3.1	New-to-mark prods manuf	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	--	--	CIS3	CIS3	CIS3	CIS3	CIS3	--	--
4.3.1	New-to-mark prods serv	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	--	--	--
4.3.2	New-to-firm prods manuf	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--	--
4.3.2	New-to-firm prods serv	CIS3**	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	--	--
4.4	Internet access/use	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2001	2001
4.5	ICT expenditures	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
4.6	VA h-tech manuf	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2000	2000
4.7	Volatility manuf	2000*	2000*	2000*	--	--	2000*	--	--	2000*	--	2000*	--	2000*	2000*	2000*	2000*	--	--
4.7	Volatility serv	2000*	2000*	2000*	--	--	2000*	--	--	2000*	--	2000*	--	2000*	2000*	2000*	2000*	--	--

* Average of this year and previous year. ** CIS3 results are for 2000, unless a specific year is mentioned. CIS3 EU means are calculated using GDP weights.

Annex Table E: European Innovation Scoreboard 2003 – Most recent years used (Associate, Acceding and Candidate countries) **

		EU15	CH	IS	NO	BG	CY	CZ	EE	HU	LT	LV	MT	PL	RO	SI	SK	TR
1.1	S&E grads	2000	2001	2001	2001	2001	2000	2001	2001	2000	2001	2001	2001	2001	2001	2001	2001	--
1.2	Work pop w 3rd educ	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	--	2002	2002	2002	2002	2001
1.3	Lifelong learning	2002	1999	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	--
1.4	Emp h-tech manuf	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2001	1999	2002	2002	2002	2000
1.5	Emp h-tech services	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2001	--	2002	2002	2002	--
2.1	Public R&D exp	2002	2000	2002	2001	2001	2001	2001	2001	2001	2001	2001	--	2001	2001	2001	2000	1999
2.2	Business R&D exp	2002	2000	2002	2001	2001	2001	2001	2001	2001	2001	2001	--	2001	2001	2001	2000	2000
2.3.1	EPO h-tech pats	2001	--	2001	2001	2001	2001	2001	2001	2001	2001	2001	2000	2001	2001	2001	2001	2001
2.3.2	USPTO h-tech pats	2000	2000	2000	2000	1998	2000	--	--	2000	1998	--	2001	2000	--	2000	1999	1997
2.4.1	EPO patents	2001	1998	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
2.4.2	USPTO patents	2001	2000	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
3.1	SMEs innov in-hse manuf	CIS3**	CIS3:	CIS3	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	CIS2: 1998	CIS2: 1999	--	CIS3	CIS3: 2001	CIS2: 1997
3.1	SMEs innov in-hse serv	CIS3**	CIS3:	CIS3	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	--	--	--	CIS3	CIS3: 2001	--
3.2	SMEs innov co-op manuf	CIS3**	CIS3:	CIS3	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	CIS2: 1998	--	--	CIS3	CIS3: 2001	CIS2: 1997
3.2	SMEs innov co-op serv	CIS3**	CIS3:	--	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	--	--	--	CIS3	CIS3: 2001	--
3.3	Innov exp manuf	CIS3**	CIS3:	CIS3	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	--	CIS2: 1999	--	CIS3	CIS3: 2001	--
3.3	Innov exp serv	CIS3**	CIS3:	CIS3	CIS3	--	--	CIS3: 2001	CIS3	--	CIS3: 2001	CIS3: 2001	--	--	--	CIS3	CIS3: 2001	--
4.1	Hi-tech VC	2001*	2001*	2001*	2001*	--	--	--	--	2001*	--	--	--	2001*	--	--	--	--
4.2	Early stage VC	2002*	--	2002*	2002*	--	--	2001*	--	2001*	--	--	--	2001*	2001*	--	--	--
4.3.1	New-to-mark prods manuf	CIS3**	--	CIS3	CIS3	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.1	New-to-mark prods serv	CIS3**	--	CIS3	CIS3	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.2	New-to-firm prods manuf	CIS3**	CIS3:	CIS3	CIS3	--	--	--	--	--	--	--	--	--	--	--	--	--
4.3.2	New-to-firm prod serv	CIS3**	CIS3:	CIS3	CIS3	--	--	--	--	--	--	--	--	--	--	--	--	--
4.4	Internet access/use	2002	--	2001	--	--	2001	2001	2001	2000	2001	2001	2002	2001	--	2001	--	--
4.5	ICT expenditures	2001	2001	2001	2001	2001	--	2001	2001	2001	2000	2000	2000	2001	2001	2001	2001	2001
4.6	VA h-tech manuf	2001	2001	--	1999	2000	--	--	--	2000	1999	--	1998	--	--	1999	--	2000
4.7	Volatility manuf	2000*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4.7	Volatility serv	2000*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

* Average of this year and previous year. ** CIS3 results are for 2000, unless a specific year is mentioned. CIS3 EU means are calculated using GDP weights.

Annex Table F: European Innovation Scoreboard 2003 – Trends (Member States, US and Japan)

		EU15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	US	JP
1.1	S&E grads	9.1	--	26.9	-9.4	--	35.1	8.9	-1.8	20.4	28.6	3.4	-0.7	33.3	7.1	46.5	29.1	-3.3	--
1.2	Work pop w 3rd educ	3.3	8.0	5.9	-4.7	4.6	15.4	12.8	16.3	11.0	1.8	8.8	18.5	3.6	4.8	-7.9	5.7	6.1	9.9
1.3	Lifelong learning	0.6	7.7	-8.6	-2.5	9.1	3.4	0.0	--	-12.7	4.6	16.9	-13.8	-8.4	6.4	--	10.7	--	--
1.4	Emp h-tech manuf	-3.7	-8.2	-3.8	3.0	-3.3	-2.1	-4.6	-5.7	-3.3	15.6	-8.9	-0.4	-7.1	2.1	-11.9	-11.4	--	--
1.5	Emp h-tech services	11.5	7.2	3.5	18.3	13.4	17.9	8.1	8.7	10.5	-9.1	13.0	30.9	14.3	7.1	9.9	9.2	--	--
2.1	Public R&D exp	2.0	4.9	0.2	-1.6	34.0	8.6	2.1	5.4	4.7	--	-10.7	--	7.6	3.5	7.5	4.9	13.4	-2.8
2.2	Business R&D exp	4.8	17.4	28.4	9.5	46.0	13.3	0.5	-6.9	8.2	--	-1.9	--	73.7	13.1	22.0	-2.4	2.7	10.1
2.3.1	EPO h-tech patents	63.6	39.5	68.8	65.9	241.1	64.5	51.3	173.9	23.2	49.5	73.9	80.9	96.9	39.4	58.7	87.2	76.6	52.1
2.3.2	USPTO h-tech patents	43.9	44.4	77.1	49.9	--	116.4	24.2	28.2	25.3	--	23.5	64.3	--	68.1	95.7	35.7	41.9	21.6
2.4.1	EPO patents	25.3	14.5	39.9	25.3	13.1	18.5	18.8	52.1	18.3	31.4	34.7	32.6	70.3	31.8	25.0	32.3	30.9	41.8
2.4.2	USPTO patents	28.1	24.5	19.3	33.6	51.2	25.9	17.6	66.7	21.1	68.7	19.9	36.2	90.7	32.8	49.8	23.5	13.3	16.2
4.2	Early stage VC	10.4	-43.1	531.6	2.9	83.3	10.3	2.9	-36.2	-18.7	--	-38.9	73.7	-22.2	57.2	85.1	58.4	188.7	--
4.5	ICT expenditures	15.5	14.0	5.7	18.3	21.2	10.2	14.7	-1.9	17.8	3.7	11.7	17.7	9.5	7.8	13.3	13.1	4.9	14.7
4.6	VA h-tech manuf	12.0	16.0	12.1	17.6	0.1	-6.1	11.1	0.3	9.7	6.5	8.9	1.8	6.7	19.1	-10.6	12.5	7.0	12.0
	Country average [1]	9.5	10.9	12.2	9.2	23.0	15.2	8.2	10.5	8.8	11.5	7.9	13.4	20.3	11.4	14.0	11.6	10.2	12.8

[1] Country averages are calculated as a weighted average. Indicators 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 4.5 and 4.6 have a weight of 1. Indicators 2.3.1, 2.3.2, 2.4.1 and 2.4.2 have a weight of 0.25. Indicator 4.2 is not included in this country average. Technical Paper No 6 gives more details.

Annex Table G: European Innovation Scoreboard 2003 – Trends (Associate, Acceding and Candidate countries)

		EU15	CH	IS	NO	BG	CY	CZ	EE	HU	LT	LV	MT	PL	RO	SI	SK	TR
1.1	S&E grads	9.1	67.4	30.0	11.7	31.7	-15.4	30.2	71.1	-26.7	47.2	19.4	153.8	63.2	3.5	8.4	55.2	--
1.2	Work pop w 3rd educ	3.3	7.1	12.3	14.2	14.9	21.0	7.0	0.3	2.0	4.8	11.2	--	9.6	12.4	-2.6	6.5	14.8
1.3	Lifelong learning	0.6	--	11.9	0.0	--	29.8	--	-17.0	6.5	-1.5	--	--	--	22.2	21.4	--	--
1.4	Emp h-tech manuf	-3.7	-3.8	20.9	-3.5	-5.3	-0.7	1.4	-13.4	2.1	-25.7	154.8	--	--	-3.1	8.1	20.0	2.0
1.5	Emp h-tech services	11.5	5.5	17.3	9.1	5.4	21.5	-0.4	2.4	7.4	-25.6	7.5	--	--	6.1	4.1	-1.7	--
2.1	Public R&D exp	2.0	-15.0	5.3	-9.7	-13.8	10.9	17.4	0.0	36.5	6.0	-16.6	--	-0.1	42.0	0.7	-25.3	4.4
2.2	Business R&D exp	4.8	1.0	55.2	4.9	-14.8	20.1	1.2	73.0	36.1	119.4	82.4	--	-19.0	-35.0	19.8	-30.3	85.8
2.3.1	EPO h-tech patents	63.6	--	59.6	294.7	72.8	286.9	29.6	132.8	226.0	13.4	30.4	9.6	44.1	40.1	309.3	176.3	76.4
2.3.2	USPTO h-tech patents	43.9	22.2	--	94.6	--	--	--	--	--	--	--	--	--	--	--	--	--
2.4.1	EPO patents	25.3	29.8	36.7	151.6	-23.9	62.3	19.8	99.3	47.9	93.5	74.7	28.3	53.5	-16.0	93.8	31.4	32.5
2.4.2	USPTO patents	28.1	6.7	178.1	42.0	1.2	96.6	5.4	534.4	26.2	43.2	-58.6	284.8	-2.3	120.2	52.4	-60.1	126.1
4.2	Early stage VC	10.4	3.8	-80.3	76.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4.5	ICT expenditures	15.5	18.6	--	-8.4	17.5	--	33.8	13.8	32.2	30.5	--	--	40.5	34.7	22.6	38.9	1.9
4.6	VA h-tech manuf	12.0	5.6	--	9.0	27.0	--	--	--	18.3	--	--	-5.6	--	--	--	--	30.6
	Country average [1]	9.5	11.6	28.6	17.3	8.6	25.6	13.5	36.8	19.4	22.0	40.0	-- [2]	20.5	13.6	22.4	12.9	29.4

[1] Country averages are calculated as a weighted average. Indicators 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 4.5 and 4.6 have a weight of 1. Indicators 2.3.1, 2.3.2, 2.4.1 and 2.4.2 have a weight of 0.25. Indicator 4.2 is not included in this country average. Technical Paper No 6 gives more details. [2] No country trend as the number of trend results is less than 6.

Annex Table H: European Innovation Scoreboard 2003 – Trend base years (Member States, US and Japan)

		EU15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	US	JP
1.1	S&E grads	1997-98	--	1996,98	1997-99	--	1997-99	1997-98	1997-98	1996-98	--	1998-99	1998-99	--	1996-98	1997-99	1997-99	1996,98	--
1.2	Work pop w 3rd educ	1999,00	1998-00	1998-00	1999,00	1998-00	1998-00	1998-00	--	1998-00	1999,00	1998-00	1999,00	1998-00	1998-00	1998-00	1999,00	1997-99	1997-99
1.3	Lifelong learning	1999-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	1998-00	1998-00	1998-00	1999-00	1998-00	1998-00	--	1999,00	--	--
1.4	Emp h-tech manuf	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1996-98	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	--
1.5	Emp h-tech services	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	--
2.1	Public R&D exp	1998-00	1997-99	1997-99	1997-99	1995,97	1997-99	1998-00	1997-99	1996-98	--	1996-98	--	1997,99	1998-00	1997-99	1998-00	1998-00	1997-99
2.2	Business R&D exp	1998-00	1997-99	1997-99	1997-99	1995-97	1997-99	1998-00	1995-97	1997-99	--	1997-99	--	1997,99	1998-00	1997-99	1998-00	1998-00	1997-99
2.3.1	EPO h-tech patents	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99
2.3.2	USPTO h-tech patents	1996-98	1996-98	1996-98	1996-98	--	1996-98	1996-98	1996-98	1996-98	--	1996-98	1996-98	--	1996-98	1996-98	1996-98	1996-98	1996-98
2.4.1	EPO patents	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99
2.4.2	USPTO patents	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99
4.2	Early stage VC	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	1998-00	1998-00	1998-00	1998-00	1998-00	1998-00	1997-99	--
4.5	ICT expenditures	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99
4.6	VA h-tech manuf	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1996-98	1996-98

Annex Table I: European Innovation Scoreboard 2003 – Trend base years (Associate, Acceding and Candidate countries)

		EU15	CH	IS	NO	BG	CY	CZ	EE	HU	LT	LV	MT	PL	RO	SI	SK	TR
1.1	S&E grads	1997-98	1997-99	--	1997-99	1997-99	1997-99	--	1998-99	1997-99	1997-98	1997-99	1997-99	--	1997-99	1997-99	1997-99	1997-99
1.2	Work pop w 3rd educ	1999,00	1998-00	--	1999,00	1998-00	--	1999,00	1998-00	1998-00	1998-00	1998-00	1998-00	--	1998-00	1998-00	1998-00	1998-00
1.3	Lifelong learning	1999-00	--	--	1998-00	--	--	1999-00	--	1998-00	1998-00	1999-00	--	--	--	1998-00	--	--
1.4	Emp h-tech manuf	1998-00	1998-00	--	1998-00	1998-00	--	1999-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	--	1998-00	1998-00	1998-00
1.5	Emp h-tech services	1998-00	1998-00	--	1998-00	1998-00	--	1999-00	1998-00	1998-00	1998-00	1998-00	1998-00	--	--	1998-00	1998-00	1998-00
2.1	Public R&D exp	1998-00	--	1997-99	1998-00	1997,99	1997-99	1998-99	1997-99	1998-99	1997-99	1997-99	1997-99	--	1997-99	1997-99	1997-99	1996-98
2.2	Business R&D exp	1998-00	--	1998-00	1998-00	1997,99	1997-99	1998-99	1997-99	1998-99	1997-99	1997-99	1997-99	--	1997-99	1997-99	1997-99	1996-98
2.3.1	EPO h-tech patents	1997-99	--	--	1997-99	1997-99	1997-99	--	1997-99	1997-99	1997-99	1997-98	1997,99	1996-98	1997-99	1997-99	1997-99	1997-99
2.3.2	USPTO h-tech patents	1996-98	1996-98	--	--	1996-98	--	--	--	--	--	--	--	--	--	--	--	--
2.4.1	EPO patents	1997-99	1995-96	--	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99	1997-99
2.4.2	USPTO patents	1997-99	--	--	1997-99	1997-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99	1998-99
4.2	Early stage VC	1998-00	1997-99	--	1998-00	1998-00	--	--	--	--	--	--	--	--	--	--	--	--
4.5	ICT expenditures	1997-99	1997-99	1997-99	--	1997-99	1997-99	--	1997-99	1997-99	1997-99	--	--	--	1997-99	1997-99	1997-99	1997-99
4.6	VA h-tech manuf	1997-99	1997-99	--	--	1995-97	1996-98	--	--	--	--	--	--	--	--	--	--	--

Technical Annex

A.1 Calculating averages

For most indicators the EU mean is a weighted average supplied by Eurostat. For the following indicators based on Eurostat data an EU average was not directly available: for indicator 1.1 the EU mean was calculated as a weighted average using shares of population 20-29 years of age and for all CIS-indicators the EU mean was calculated as a weighted average using GDP shares.

A.2 Calculating trend data

Trends are calculated as the percentage change between the last year for which data are available and the average over the preceding three years, after a one-year lag. The three-year average is used to reduce year-to-year variability; the one-year lag is used to increase the difference between the average for the three base years and the final year and to minimize the problem of statistical/sampling variability. For example, when the most recent data are for 2002, the trend is based on the percentage change between 2002 and the average for 1998 to 2000 inclusive. The results for 2001 are excluded in order to provide a one-year lag. There are several exceptions to this rule due to a lack of adequate data. Technical Paper No 2 provides the specific years used to calculate the trends for each indicator per country.

The aggregate trend per country is calculated as a weighted average of the trend values of the various indicators. The following weights were used for calculating average country and EU-15 trends:

- 1 for indicators 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 4.5 and 4.6.
- 0.25 for indicators 2.3.1, 2.3.2, 2.4.1 and 2.4.2.

The trend data for indicator 4.2 (share of early-stage venture capital) were excluded. Technical Paper No 6 provides a more detailed explanation.

A.3 Summary Innovation Index

Both SII-1 and SII-2 are calculated using re-scaled values of the indicators, where the highest value is set to 1 and the lowest value to 0. The SII is then calculated as the average value of all re-scaled values and is by definition between 0 and 1. The following weights were used for calculating the averages SII scores:

- 1 for indicators 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 4.1, 4.2, 4.4, 4.5 and 4.6.
- 0.5 for indicators 2.3.1, 2.3.2, 2.4.1, 2.4.2 and the manufacturing and services sub-indicators of indicators 3.1, 3.2, 3.3, 4.3.1, 4.3.2 and 4.7.

Technical Paper No 6 provides a more detailed explanation.